BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 58 1961 No. 5

SUMMARY OF RECENT ABSTRACTS*

IV. TRYPANOSOMIASIS†

AFRICAN TRYPANOSOMIASIS

HUMAN

General

NASH (p. 973) has contributed a review of the African trypanosomiasis problem in which he deals with the diagnosis, treatment, epidemiology and control of *Trypanosoma gambiense* and *T. rhodesiense* infections of man, and nagana of animals. This is a survey of past work and present practice, written by an officer who has been intimately concerned with it for over 30 years; it is extremely valuable, and should be read in full.

The report for 1958–59 of the Tsetse Fly and Trypanosomiasis Committee of the Colonial Office (p. 685) relates chiefly to chemotherapy and chemoprophylaxis, but remarks that eradication of the disease in man and animals calls for many different control measures, which will require continued research. LUMSDEN (p. 561) gives an account of the work of the East African Trypanosomiasis Research Organization for 1958, and WILLETT (p. 1246) reports on the work of the West African Institute for Trypanosomiasis Research during 1959. These 3 reports should be read in full.

The report of the Trypanosomiasis Commission of Mozambique for 1957 (p. 686), which also should be read in full, shows that human sleeping sickness still occurs in small numbers. For control of flies 10,166 animals were destroyed in a programme of indiscriminate game destruction.

The report of the 7th meeting of the International Scientific Committee for Trypanosomiasis Research (p. 559) contains many important papers on human and animal trypanosomiasis in Africa.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series, see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

Epidemiology

SCOTT (p. 343) discusses the history of sleeping sickness in northern Ghana, where the first case was diagnosed in 1906 and there was a considerable outbreak in 1937. The disease appears to be contracted in the bush and on farms remote from villages, or at water points, and infection is correlated with proximity to major rivers, enhanced by proximity to important roads. This pattern of distribution differs from the pattern existing in Ashanti, where fly is ubiquitous. The author thinks that there may be a non-domestic animal reservoir.

MORRIS (p. 562) traces the history of sleeping sickness in Kenya, where one early outbreak was finally checked by spontaneous movement of the people away from the haunts of *Glossina palpalis*, others by treatment and clearing, and one by treatment and eradication of tsetse flies by spraying riverine vegetation with DDT. The disease is still found in people who live on or visit the lake shore, and it could probably be eliminated by attack on persistent endemic foci when otherwise it is quiescent. He (p. 1026) gives an account of the history of *T. gambiense* sleeping sickness in the Lake Edward and Lake George areas of Uganda. This was formerly an extension of the disease from endemic areas in the Congo, and became epidemic as a result of the increased movement which followed European administration. The people were evacuated in 1913 into an area containing riparian fringing forest, where contact between man and *G. palpalis* was close and regular, and the disease persisted in inter-epidemic periods.

An outbreak of *T. gambiense* infection in Uganda in 1957 was associated with dense concentration of the population along a river, with resulting absence of game (including crocodiles) so that the flies were driven to feed on man and stock; MORRIS (p. 106) comments on the prolonged symptomless stage which permits extensive movement of infected persons. Control was effected by spraying riverine vegetation with dieldrin, and by mass treatment.

Uganda has experienced epidemics both of *T. gambiense* and of *T. rhodesiense* sleeping sickness. SHORE (p. 1247) discusses an outbreak in the Lango district in and after 1955. The epidemic pattern in some respects resembled that of *T. rhodesiense*, and energetic measures were taken to control it, partly by dieldrin spray and partly by survey and treatment. The degree of control achieved was not very high. In one *G. morsitans* and *G. pallidipes* belt, extermination of big game was undertaken.

BLOSS (p. 1026) reviews the history of sleeping sickness in the Sudan, pointing out that the problem of control is very complex, involving knowledge of the vector, the people—their languages and customs—the fauna, the flora and the geography of the area. But modern control makes social and economic progress possible.

In Tanganyika (p. 13) there was a slight rise in notifications of trypanosomiasis in 1958, partly owing to resettlement of a fly-infested valley. Control measures have appealed to the people, so that in one area they decided to pay more taxes so as to employ full-time clearing gangs, rather than undertake the communal effort previously in vogue. In a *T. gambiense* focus pentamidine prophylaxis has been abandoned in favour of spraying with dieldrin for the control of *G. palpalis*.

Transmission: Animal Reservoirs

SAUNDERS (p. 687) observed 2 ovarioles in each ovary of *G. morsitans*, not 1 as formerly described, and found that eggs are produced alternately from right

and left ovaries. He (p. 1028) shows how, by observing the follicular debris of the ovaries, the age of female *G. morsitans* can be estimated up to about 40 days.

BURSELL (p. 886) uses a measure for tsetse flies which is a function of the dorsal thoracic surface. With GLASGOW (p. 1027) he shows that in Kenya the lake-side *G. palpalis fuscipes* and their pupae tend to be rather smaller than riverine *G.p. fuscipes*, and discusses this in reference to hunger. He (p. 793) has estimated the water balance of resting tsetse flies, and has observed that newly emerged *G. morsitans* and *G. swynnertoni* lose water more slowly in the natural habitat than in the laboratory, possibly because they seek microclimates of high relative humidity. He (p. 1148) observes that the extent of pigmentation of the abdominal bands of *G. pallidipes* depends on the humidity of the environment of the pupa—full pigmentation was produced in saturated air, and *vice versa*. The effect of humidity on coloration of certain other tsetse flies was almost nil. He (p. 1249) analysed *G. morsitans*, observing that certain amino acids constitute a reserve in conditions of starvation.

WILLIAMS (p. 794) investigated the effect of atmospheric pressure on *G. morsitans* infected with *T. rhodesiense* or *T. congolense*, concluding that high altitude would not be a limiting factor to survival of the flies. He also investigated the effect on *Aedes aegypti* infected with *Dirofilaria immitis*.

FORD *et al.* (p. 16) describe a technique of fly catching by following paths cut so as to traverse the principal vegetation communities, and catching the flies at equidistant points; these paths are called transect fly rounds—they have proved easy to lay out and they have produced useful results.

By marking *G. palpalis* coming to fly-boys, and noting the numbers which returned to them 17 days or more later (18 days being the period for a fly to become infective after biting an infective person) PAGE and MCDONALD (p. 16) have shown that the flies return to the same subject much more frequently in Northern Nigeria than in Southern Nigeria, indicating much closer man-fly contact in the north, especially in the dry season. In Nigeria MCDONALD (p. 793) marked *G. palpalis* and *G. submorsitans* with luminescent pigments which show after dark in a beam of ultra-violet light. After release *G. palpalis* was found to rest at night only on leaves or twigs about 12 inches from the ground, but *G. submorsitans* used similar surfaces and creeper up to 15 feet, and mostly over 7 feet. PAGE (p. 226) describes a study of the ecology of various tsetse flies in Southern Nigeria; one point of interest is the observation that *G. palpalis*, which is strictly riverine further north, is able to frequent woodland savannah throughout the year in this southern area fringing the forested belt of Southern Nigeria.

In transmission experiments with *G. morsitans* and *T. rhodesiense* ASHCROFT (p. 225) found that more male than female flies became infected, and males survived longer than females (though this may have been explicable by the technique of keeping the flies).

TENDEIRO *et al.* (p. 226) report that *G. palpalis* has again been found on the island of Principe, from which it was cleared more than 40 years ago. No trypanosomiasis has been found.

ASHCROFT *et al.* (p. 224) infected various wild African animals with *T. rhodesiense*, *T. brucei* or *T. congolense*. Infections with *T. rhodesiense* closely resembled those due to *T. brucei*, affording strong evidence of wild reservoir hosts of *T. rhodesiense*. Certain animals are usually killed by these two trypanosomes, and these animals are not usually fed upon by tsetse in nature. Other animals are common sources of food, but high resistance to the trypanosomes

is not necessarily correlated with importance as a source of food for the flies. He (p. 344) discusses the importance of wild animals as reservoirs of trypanosomiasis in Africa, concluding that some animals, such as warthog, may be less important than might be expected from their importance as host for tsetse, whereas others such as kudu, giraffe and reedbuck, which are less frequently bitten, may be more important in that they are more effective carriers.

Aetiology

CLARK (p. 455) compared the morphology of 4 genera of trypanosomes; the paper should be read in full.

OSAKI (p. 792) has identified 24 antigenic types of a laboratory strain of *T. gambiense* maintained in white mice. In an investigation of the antigenic structure of *T. gambiense* FROMENTIN (p. 887) found that when infected mice are treated with a subcurative dose of tryparsamide, there is always a change of the antigenic type in the relapse trypanosomes present in the blood, but this may not be so with all the trypanosomes which remain in the inner organs. The same worker (p. 14) investigated an old laboratory tryparsamide-resistant strain of *T. gambiense* (Yaoundé resistant strain) with which a laboratory worker was accidentally infected. Cure was effected with lomidine. The strain was not altered by this passage through man. The serum of the patient taken 3–14 months after infection cured infected mice.

African trypanosomes tend to lose infectivity for mammals after maintenance in culture, and it has previously been found that trehalose (which is present in insects but not in the blood of mammals) when added to cultures of *T. rhodesiense* makes the trypanosome infective; GEIGY *et al.* (p. 107) show that trehalose occurs in tsetse flies, and WEINMAN (p. 792) states that cultures of *T. gambiense* and *T. rhodesiense* are activated by this sugar, though it is not the only factor concerned in infectivity. [But see GORDON, below.]

ASHCROFT (p. 224) reports on the strain of *T. rhodesiense* which has been maintained in Tanganyika by cyclical transmission through tsetse flies and sheep (or antelopes or monkeys) since 1934, and which is still pathogenic for man. Virulence has apparently been increased by passage through monkeys and antelopes, and decreased by passage through sheep. He considers that *T. rhodesiense* is often found in wild animals, *T. gambiense* is mainly a parasite of man, and *T. brucei* is not pathogenic for man. He (p. 230) shows that a strain of *T. brucei* transmitted by syringe through young rats for 5 months increased in virulence for them.

MÜHLPFORDT (p. 15) observed that when certain trypanosomes were repeatedly treated with trypaflavine, the kinetoplast disappeared; the process is discussed.

VON BRAND and TOBIE (p. 1147) infected animals with strains of trypanosomes which had different characteristics (for instance, some had no kinetoplast, others were resistant to arsenic). The strains differed in their rates of reproduction, and this fact appeared to determine the rate of disappearance of one of the strains in a mixed infection; there was no evidence of hybridization. From experiments with *T. rhodesiense* resistant to either atoxyl or antrypol and inoculated into animals treated with these drugs AMREIN and FULTON (p. 229) conclude that there is no indication of sexual processes in the multiplication of these trypanosomes; resistance was not transferred from one strain to another in the mammalian host or in tsetse flies.

FULTON (p. 1147), however, reports encouraging results from an attempt to

transfer drug resistance to a strain of *T. rhodesiense* with undegraded DNA from a strain of the same organism made resistant to arsenicals. In discussion GORDON remarked that he had not been able to confirm Weinman's observations [above] that trehalose added to culture media rendered non-infective cultures infective.

GRANT and SARGENT (p. 1248) discuss the respiration of *T. rhodesiense* in relation to glycerophosphate oxidase.

Control

In discussing sleeping sickness in Northern Nigeria the author of the Annual Report for 1958 (p. 343) remarks that mass diagnosis and survey can control but not eradicate the disease. Pentamidine prophylaxis was valuable, and insecticidal spraying was cheaper than control of vegetation. Changes were made in the organization of Field Units, which will, however, continue to work as in the past.

MITCHELL and STEELE (p. 17) report on tsetse flies in Nyasaland, where trypanosomiasis of cattle is a major curb to development but where human sleeping sickness is rare. The basic principle for fly control is the correct use of land, with discriminative clearing to assist new development. Insecticides are largely unsuitable for control in these conditions and destruction of game is not readily accepted as a control measure. SWAN (p. 1030) reports on tsetse control in Northern Rhodesia, where great fly belts exist and trypanosomiasis occurs in man. Near Lake Tanganyika *G. palpalis* has been controlled by insecticides, particularly dieldrin.

DAVIES (p. 1029) found that spraying riverine vegetation with DDT was successful in controlling *G. tachinoides* in the dry savannah zone of Northern Nigeria, but less so in moister areas: dieldrin, however, was found to be successful; it was used on vegetation up to 4 feet from the ground.

KIRKBY *et al.* (p. 1249) give an account of the campaign against *G. morsitans submorsitans* and *G. tachinoides* in Northern Nigeria, where spraying with DDT proved successful in association with ruthless clearing of a wide barrier at one side of the affected area. Details are given, including costs, which should be sought in the original. Selective spraying seems to be very successful.

KERNAGHAN and DAVIES (p. 228) report a field trial of control of *G. palpalis* by obstructive clearing in Northern Nigeria, and conclude that this method is substantially successful in discouraging the fly. It is cheaper than partial clearing.

Pathology: Clinical Findings

ROBERTSON and JENKINS (p. 345) investigated the effect of *T. rhodesiense* infection on the liver, in patients observed in Uganda, concluding that a parenchymatous disorder occurs which varies greatly in severity and which can be reversed by treatment. They think that the intolerance to large doses of Mel B which is occasionally observed may be due to hepatic dysfunction in patients who are severely ill.

WOODRUFF (p. 108) infected monkeys with *T. rhodesiense* and at intervals observed the pattern of serum proteins. Gamma globulin was rapidly and markedly increased, but declined when parasitaemia ceased. There was evidence to suggest that antibodies are present in only a small fraction—and not the whole—of the gamma globulin, and it is thought that disintegration products of the trypanosomes and leucocytes may account for much of the globulin. Serum albumin decreased, but not significantly. SMITHERS and TERRY (p. 107)

found that monkeys infected with *T. gambiense* had lymphocytosis and an increase in serum gamma globulin with a decrease in albumin, such as occurs in *T. rhodesiense* infection.

FROMENTIN *et al.* (p. 453) discuss serum cholesterol in albino rats infected with *T. gambiense.*

KAMOHARA (p. 796) has demonstrated an agglutinating action of a proportion of human sera from normal persons or persons with certain diseases, against *T. lewisi* and *T. gambiense*; some sera have a protective action against *T. gambiense* infection in mice.

PAUTRIZEL *et al.* (p. 687) describe a technique for obtaining an improved antigen from *T. equiperdum* which has proved valuable in the complement-fixation test for sleeping sickness.

DUGGAN (p. 344) discusses the clinical course of *T. gambiense* sleeping sickness, which by no means always fits the classical picture. He suggests that invasion of the blood may be followed by death or by spontaneous cure, or it may go on to changes in the central nervous system which may be fatal or may become "burned-out". The clinical phenomena are related to the host-parasite relationship, and the state of this may be interpreted from the erythrocyte sedimentation rate. The paper should be read in full.

Treatment: Drug Resistance

Mel W (pentylthiarsaphenylmelamine) has already been found effective in *T. gambiense* infection, and DE JONGH and FRIEDHEIM (p. 795) now report a group of patients treated in Liberia with 2 series of daily intramuscular injections, lasting 4 days each, with an interval of 2 weeks. Results were very good, with almost no toxic side effects, and the authors conclude that it is an active and well tolerated drug for all stages of the disease.

BAKER (p. 109) tried nitrofurazone on mice infected with *T. rhodesiense,* but the results were not good. APTED (p. 1029) used nitrofurazone in a few patients with *T. rhodesiense* infection, with or without Mel B. Some who would otherwise have died have remained well, and others were helped though the final outcome is uncertain. Nitrofurazone merits further study.

PÉLISSIER (p. 347) discusses a patient who had been infected with a trypanosome for 9 years, which had resisted treatment with arsenicals, antimonials and pentamidine. He thinks that it may have been an "animal" strain (possibly related to *T. congolense*) in the process of adapting itself to man, but in comment Baker suggests that the treatment given may have conduced to the state of drug resistance, and that the description given could apply to a strain of one of the *T. brucei* group. LAPEYSSONNIE (p. 1028) reports a woman who has had trypanosomes in the blood, lymph juice and bone marrow, when examined, over a period of 21 years. The trypanosomes appear to be resistant to drugs, and to be perfectly tolerated by the patient. In comment Hawking suggests that they resemble *T. congolense* rather than *T. gambiense.*

TAYLOR (p. 1148) shows that *T. rhodesiense* in rats treated with prothidium take up the drug, as they also do when exposed to it *in vitro,* but in comment Hawking remarks that they do not take it up as much as they take up tryparsamide or acriflavine. She (p. 1149) reports on the absorption, distribution and excretion of prothidium in rats, rabbits and cattle.

WILLIAMSON and ROLLO (p. 453) made a laboratory strain of *T. rhodesiense* resistant to several compounds and then tested it for resistance to another range

of compounds, but though resistance to a member of one class of compounds entails resistance to other members of the same class, it may also entail resistance to members of the other classes, in a way which cannot yet be explained. The drugs probably first combine with a specific site on the trypanosome and then react chemically with the cytoplasm, and alterations in resistance are probably concerned with the fixation of the compound. This was borne out in experiments with para-aminobenzoic acid and surface-active substances which inhibit trypanocidal action in some drugs. Resistance is probably related to physical changes in specific cellular structures associated with fixation.

SOLTYS (p. 15) shows that a strain of *T. brucei* resistant to immune serum proved to be markedly more resistant than a normal strain to suramin and Antrycide; a strain made resistant to suramin was fully sensitive to immune serum. In comment Ormerod remarks that this is a convincing demonstration of the fact that some trypanocidal substances owe part of their activity to the immune response of the host.

ANIMAL

The Inter-African Advisory Committee on Epizootic Diseases (p. 563) has published a symposium on animal trypanosomiasis, which should be read in full; it has its importance for human welfare in Africa.

MERCADO and VON BRAND (p. 688) discuss liver glycogen and lipid in some trypanosome (and other) infections of rats.

WEITZ (p. 688) has identified an exoantigen produced in rats by *T. brucei*, which is a component of infected rat serum moving more slowly than gamma globulin on electrophoresis. Repeated injections of exoantigen actively immunize rats and mice to the homologous strain of trypanosomes.

The conglutinin phenomenon occurs in the serum of animals infected with trypanosomes, and the more virulent the infection the higher the titre; INGRAM and SOLTYS (p. 1149), working with *T. brucei*, found that the titre fell after successful treatment, which is not the case with titre of neutralizing antibody.

TRAGER (pp. 348, 1150) has grown *T. vivax* to the infective stage in tissue culture of tsetse fly tissues, and suggests that attenuated cultural trypanosomes might be useful for immunization. *T. brucei* and *T. congolense* could also be grown but attempts to infect mammalian hosts with these cultures were unsuccessful. DESOWITZ (p. 689) discusses immunity to *T. vivax* in various breeds of West African cattle. The immune response in the adult animal seems to be influenced by the stimuli it received as a calf, either by antibodies from the dam's colostrum, or by infection through flies, and resistant breeds differ from susceptible in the nature of the secondary response after they have been sensitized as calves.

PAUTRIZEL *et al.* (p. 349) discuss the antibody and plasma changes which occur during experimental infection of rabbits with *T. equiperdum*. The original abstract should be read in full. BOUISSET and RUFFIE (p. 790) observed that rats infected with *T. equiperdum* survived longer than controls when their body temperature was lowered to 30°C. by means of drugs; they think that this finding may have a clinical application.

CORRADETTI and VEROLINI (p. 565) write on the behaviour of *T. lewisi* in rats, and the immune reactions before and after splenectomy. From experiments in rats infected with *T. lewisi* and from observations on the cytoplasmic inclusions before and after crisis, ORMEROD (p. 797) suggests that the multiple inclusions

observed in developing trypanosomes before the crisis contain an antigenic factor stimulating the formation of trypanocidal antibody, with which it reacts to produce the crisis. The single inclusion observed in adult trypanosomes which survive the crisis possesses different antigenic properties.

American Trypanosomiasis

General: Epidemiology

Rodenwaldt (p. 18) gives an account of the distribution of *T. cruzi* infection.

Gaikhorst (p. 1031) reports that although *T. cruzi* has been found in triatomid bugs in Aruba, Netherlands Antilles, there is no evidence of the disease in man. It occurs in Guatemala, where De León (p. 1252) conducted a survey of which he gives details; the disease is tending to disappear as a result of the use of insecticides. Torrealba *et al.* (p. 352) estimate that a million people in Venezuela are infected; they discuss diagnostic tests and clinical features. In blood from patients with myocarditis, corpses, blood donors, and newborn infants in Venezuela, Maekelt (p. 691) found relatively high proportions of positive complement-fixation tests.

Cornejo Donayre (pp. 230, 231) gives accounts of the disease in Peru.

Jatene and Jacomo (p. 352) found that 15% of unselected blood donors in Uberaba (Brazil) were positive to the Machado-Guerreiro reaction, and they recommend that all blood for transfusion in endemic areas should be sterilized *in vitro* with gentian violet.

Neghme and Román (p. 1251) discuss epidemiological methods used in Chile where 12% of 14,756 persons surveyed gave positive xenodiagnostic tests. 44% of triatomid bugs were positive and 10.9% of reservoir animals were found to be infected.

Transmission: Animal Reservoirs

Rhodnius prolixus normally harbours a fungus in the gut, and Mühlpfordt (p. 798) infected such bugs, and others raised without the fungus, with *T. cruzi*; certain small differences were observed in the rate of development of the trypanosomes. Harrington (p. 1032) found that *R. prolixus* deprived by egg sterilization of their gut symbiont and subsequently reared in sterile conditions did not proceed to adult stage. Growth and moulting are possible for the earlier larval stages because the necessary substances (which may be vitamins) are in the egg, but these are not enough to complete development to the adult stage. He (p. 1032) describes a simple apparatus for feeding *R. prolixus*, which involves a thin rubber membrane through which the bugs feed, and discusses the composition of materials used for the diets. Silva (p. 889) carries out xenodiagnosis by allowing bugs to feed on defibrinated blood from the suspected person; the blood is in a container occluded by a membrane through which the bugs feed. The method is easy and successful.

Lavoipierre *et al.* (p. 19) describe in detail the manner in which triatomine bugs normally obtain their blood meal, which is always taken direct from a capillary. Bites in human volunteers produced little reaction, even when repeated during many months.

Elkeles (p. 798) suggests that *T. cruzi* may not be transmitted by the contaminative method through infected faeces of the vector, but by its bite.

DIAS and SEREBRENICK (p. 351) discuss the influence of climate on the distribution of reduviid bugs in part of Brazil. DE LUCENA (pp. 350, 458) gives an account of a survey of Chagas's disease in Pernambuco, where 13.14% of the triatomids were found to be infected; *Panstrongylus megistus* is the most widespread. DI PRIMIO (p. 459) gives an account of *P. megistus* in part of Brazil, where it invades houses in the warm part of the year, but hibernates in the cold. In Paraguay *Triatoma infestans* is the only species known to be able to transmit *T. cruzi* (VELÁZQUEZ and GONZÁLEZ, p. 1252).

DE SIQUEIRA (p. 888) reports on the identification of blood meals in triatomine bugs.

NORMAN *et al.* (p. 351) isolated *T. cruzi* from opossums, a raccoon and a skunk in Georgia and Florida; the strains differed in virulence. DEANE (pp. 690, 691) has observed a new host naturally infected with *T. cruzi* and *T. rangeli* in Pará, the opossum *Metachirops o. opossum*, and also that *Didelphys m. marsupialis* may also carry these infections.

Aetiology

BOCK *et al.* (p. 798) describe the development of *T. cruzi* in tissue culture. HOREN (p. 887) describes a technique for long-term cultivation of *T. cruzi* and *Leishmania donovani* in a semi-solid blood agar medium. ZELEDON (p. 566) discusses the differentiation of *T. rangeli* and *T. cruzi* in a fluid medium, and also (p. 954) reports studies on endogenous respiration and respiration in the presence of glucose, in *T. cruzi* and other flagellates.

ACUÑA and MASSA (p. 1031) note that the cytoplasm of *T. cruzi* contains an abundant chondriome in granular form, and rich in ascorbic acid; animals suffering from vitamin C deficiency are refractory to *T. cruzi*. Addition of ascorbic acid to a culture medium produced enlargement of the chondriome and an increase in the number of flagellates.

RÊGO (p. 356) found tissue forms of *T. cruzi* in the blood of infected mice, and discusses their origin.

FERNANDES *et al.* (p. 457) discuss nucleotide and polynucleotide synthesis in *T. cruzi*, and the effect of the aminonucleoside of stylomycin on the parasite in tissue culture and in mice. The original abstract should be read in full.

Isabel I. SILVA (p. 456) describes cystic forms of *T. cruzi* in *Triatoma infestans*, comparable with those of flagellates of insects but not, so far as is known, with the metacyclic stages of trypanosomes of vertebrates. She has apparently shown that these cysts are viable outside the host's body, and concludes that the course of development of *T. cruzi* in its vector is determined by the source of the infection—flagellates derived from blood develop to metacyclic forms, whereas those derived from resistant cysts give rise to cysts again. In comment Hoare suggests that the evidence produced does not dispose of certain serious objections to the acceptance of this interpretation of the findings. A similar dual process is also reported by L. H. P. DA SILVA (p. 565).

Tests: Clinical Findings

SALUM *et al.* (p. 21) observed increase in alpha-2 and gamma globulins in the sera of patients with Chagas's disease.

FIFE and MUSCHEL (p. 353) discuss a test in which the fluorescent-antibody technique is used, and compare it with the complement-fixation test; it can be an important addition to the diagnostic methods. DE ALMEIDA *et al.* (p. 567)

discuss the ratios between antigen, antibody and complement-fixation test for this disease; for details the original should be consulted. SCORZA *et al.* (p. 568) applied the principle of the Sabin and Feldman dye test to Chagas's disease, and found it more accurate than the complement-fixation test. Details of technique are given in the original abstract.

AMATO NETO (p. 20) has produced a monograph on the acute forms of Chagas's disease.

PRATA (p. 355) discusses prognosis and complications. Cardiac insufficiency was prominent in his series, with a latent period of 10-40 years, and with a bad prognosis, especially in young people. PORTO (p. 21) found electrocardiographic changes in children with positive Machado-Guerreiro tests, which may represent the first steps in the development of the disease. GALINDO (p. 231) examined 150 patients with cardiomegaly in Guayaquil; on the basis of strongly positive complement-fixation tests 14.6% of these could be diagnosed as having Chagas's disease. Myocarditis was a common feature in patients in a Venezuelan hospital in 1951–54, and BERNING (p. 232), who investigated them, concludes that Chagas's disease was the common cause; it is a major epidemiological problem. MARQUES *et al.* (p. 692) report on an electrocardiographic study of patients with Chagas's disease in Pernambuco; changes were very common, and often serious.

KÖBERLE (p. 569) discusses the pathogenesis and importance of the disease, and its cause and sequelae, including the " mega " phenomena of hollow viscera and the cardiac affections. With PENHA (p. 571) he investigated the intramural nervous system in the enlarged oesophagus, where the ganglion cells may largely be destroyed. He also (p. 572) points out that there is a form of bronchiectasis in which similar injury to the ganglion cells of the bronchial tree occurs. SCHWARTZBURD and KÖBERLE (p. 799) report widespread destruction of ganglion cells in the spinal cords of infected rats, and GOMES DE ALCANTARA (p. 799) found similar destruction of ganglion cells of the heart in experimentally infected rats.

DE REZENDE and RASSI (p. 889) discuss the " mega " diseases which they attribute to a toxin from *T. cruzi* which destroys nerve plexuses. Mega-oesophagus is an early and sure indicator of Chagas's disease, and indicates later development of heart disease; any suggestion of dysphagia should indicate a Machado-Guerreiro test. DE BRITO and VASCONCELOS (p. 354) discuss the pathology of the cardia of the stomach in biopsy material from patients with mega-oesophagus; the abstract should be read in full. LAUAR *et al.* (p. 233) show that incomplete emptying of the oesophagus, even without indication of dilatation, suggests this disease; the delay in emptying can be demonstrated by serial X-ray.

CARDOSO (p. 354) discusses recto-sigmoidectomy in the treatment of megacolon in Chagas's disease; the results were mostly favourable.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

EAST AFRICA HIGH COMMISSION. **Annual Report of the East African Institute of Malaria and Vector-Borne Diseases, July, 1959–June, 1960** [PRINGLE, G., Director]. 19 pp., 2 figs. (1 coloured). 1960. Dar es Salaam: Govt. Printer. [Shs. 3/-.]

One of the main topics of interest in this well produced report is the study of the continuation phase of the Pare-Taveta Malaria Control Scheme, following the interruption of regular dieldrin spraying between 1958 and 1959. Information has been collected on the parasite densities in the human population from 5 to 10 months after the cessation of spraying and this has shown that the previous level of control of malaria is beginning to break down. The parasite rate in persons of all ages with fever has risen from 5·3%, 26–35 weeks after the last dieldrin spray round, to 13·6%, at 56–65 weeks. A minor outbreak of fresh malaria cases was found in October and November 1959, and this was repeated in January and February 1960, with evidence of a significant rise in infection in April 1960. The densities of *Anopheles gambiae* in houses treated with insecticide were higher in 1960 (up to the time of the report) than in 1959, although age-grouping of the catches did not show any increased longevity of the vector. *A. funestus* (type form), except for one or two doubtful specimens, has not returned to the control area.

Other studies on malaria are continuing, in particular an investigation of malaria infection in the village of Gombero, near Tanga, which was surveyed a quarter of a century ago, research into the fresh-water and salt-water forms of *A. gambiae,* host selection in relation to sporozoite infection, secondary vectors of malaria, and ageing studies on populations of *A. funestus* and other mosquitoes. The average daily mortality of *A. funestus* has been found to be higher (9–14%) than that of *A. gambiae* from the same area. It is suggested that the main vectors of malaria have daily mortalities around 10%, other species of *Anopheles* that rest out-of-doors and *Culex fatigans* have mortalities of 15–25%, and that a third group, here mainly *Mansonia africana,* are very short lived with mortalities between 30 and 40%.

Investigations into schistosomiasis have shown that *Bulinus* (*Physopsis*) *globosus* and *B.* (*P.*) *nasutus* are natural vectors of human schistosomiasis in coastal areas of Tanganyika, and the ecology of *B. globosus* is being studied as a preliminary to experiments in control A long-term study on the association of *Schistosoma haematobium* infections in adolescent girls with later gynaecological and urinary disorders is being developed also.

Complaints that residual spraying against malaria vectors has been followed by increased house-fly densities have led to investigations into the best method of measuring house-fly populations, and to the development of a standard catching frame, 18 in. square, grooved at 1-in. intervals to receive strands of sisal string which are covered with hot attractant " tangle foot " (2 lb. resin, 19 fluid oz. castor oil, 1 fluid oz. cod-liver oil) and hang vertically.

Other investigations are reported on the haemoparasites of East African vertebrates, including the finding of a new species of *Plasmodium* from the scaly-tailed flying squirrel, *Anomalurus fraseri orientalis,* the sandflies of the north-east Ethiopian region, and chemical studies on the fate of dieldrin in the bodies of spray-men and serum proteins in adolescent children at Pare.

[For the 1958–1959 Report, see this *Bulletin,* 1960, v. 57, 776.]

B. R. Laurence

[Readers will have learnt with great regret of the death of Dr. Bagster Wilson, whose name will always be associated with the Institute. *Ed.*]

CHOW, Lien-Pin. **Malaria in Taitung a Decade Ago.** *J. Formosan Med. Ass.* 1960, May 28, v. 59, No. 5, 302–7. [15 refs.]

"For the reference of the present malaria surveillance program, the result of the malaria-survey undertaken in Taitung hsien in March 1948 was reported. Examination of 2,089 primary school children at eight towns/villages in the area revealed that the spleen rate was 37.6 per cent, A. E. S. 1.73 and the parasite rate 9.7 per cent. Nine species of anopheles were identified of which three species, namely *A. bengalensis, A. lindesayi* and *A. leucosphyrus* were newly reported from the locality."

LAURENCE, B. R. **Anopheline Mosquitoes and Malaria.** Reprinted from *Pest Technology.* Manchester. 1960, Nov., v. 3, No. 2, 36–40, 1 fig. [18 refs.]

A general account.

PETERS, W. **Body Temperature and Holoendemic Malaria in New Guinea.** *Med. J. Australia.* 1960, Oct. 22, v. 2, No. 17, 657–9.

The intense malaria transmission which prevails in Sepik District of Papua and New Guinea gives rise to holoendemic disease in the local population. [Throughout the rest of this paper reference is made only to the Maprik area, which is included in the above district.] In the Maprik area the infant mortality [infants include all children up to the age of 18 months] is known to be up to 60%.

The author simultaneously recorded the axillary temperature and examined the blood for malarial parasites, on a single occasion during the day in a large group (611) including all ages. His result shows, assuming an axillary temperature of 98·5°F. (recorded after 3 minutes' maintenance in position of the thermometer) to be "normal", that 57·6% of children below the age of 5 were febrile, while of those between 5 and 19 years, 64·5% showed a minor degree of fever and the same applied to 54·1% of the adults. It is pointed out that in the last two groups the great majority showed a rise in temperature

of less than 1° above normal which could be attributed to a long walk in the sun to the place of examination. However, 28% of the young children showed a significant degree of pyrexia, ranging from 99·4° to 104·4°, corresponding proportions in the other two age-groups being 20·7% and 7·3% respectively.

Of 123 children below 5 years of age 84·9% of those without pyrexia and 91·4% of those who were febrile showed malarial parasitaemia, this difference being without significance. The arithmetic mean of the parasite densities showed no difference between the febrile and the afebrile group in all three species of parasite present (*P. falciparum, P. vivax* and *P. malariae* were all represented).

The author makes the point that a high degree of premunity is rapidly developed by the children in this area and that in the febrile child alternative causes should be sought. For example, several cases of encephalitis of unknown aetiology have already been recognized in the Maprik area.

J. H. Walters

FAN, P. C. **Transfusion Malaria. Report of One Case.** Reprinted from *Chinese Med. J.* Taipei. 1958, Mar., v. 5, No. 1, 26–8.

Before and during the Second World War, there were several reports of transfusion malaria in China [this *Bulletin,* 1937, v. 34, 61; 1940, v. 37, 789; 1941, v. 38, 505; 1948, v. 45, 143]. The author, from Taiwan, lists 7 such records, which reveal incidences of 1·5% to as high as 43·3% and involvement of all 3 main species of parasite.

Since the war, blood transfusion is much more commonly employed and more cases of transfusion malaria have occurred, especially in endemic areas in central and south China and in Taiwan.

The author underlines the potential risk by describing in detail the case of an infant who developed shock, pallor and jaundice on the 7th day of life. He received 20 cc. of blood from his father, who had a history of annual attacks of benign tertian and quartan malaria. Within 3 days the infant developed chills and fever, but was not treated. When seen on the 22nd day he was acutely ill with extreme pallor, hepatosplenomegaly and marked dyspnoea. A blood film showed amoeboid forms of *Plasmodium vivax* and *P. malariae.* Despite specific treatment for malaria and emergency supportive measures, the child died 6 hours after admission from cardiac and respiratory failure.

The author discusses the difficulty of obtaining reliable histories from donors in endemic areas and of detecting parasites in latent carriers; the value of immediate chemoprophylaxis is limited in emergency transfusions and it is recommended that where possible it should be given for some days before transfusion to the donors and thereafter to all recipients. The blood in the blood bank should be stored at a temperature between 4 and 10°C. for one week [but GRANT *et al.* (*ibid.*, 1961, v. 58, 8) recently reported a case of transfusion malaria in which the blood had been stored for 14 days at 4–6°C.: this viability of plasmodia at low temperatures was recorded by HUTTON and SHUTE more than 20 years ago (*ibid.*, 1940, v. 37, 456)].

H. J. O'D. Burke-Gaffney

DUGGAN, A. J. & SHUTE, P. G. **Quartan Malaria Relapsing after Thirteen Years.** *J. Trop. Med. & Hyg.* 1961, Jan., v. 64, No. 1, 20–21.

The authors point out that quartan malaria may persist for many years after the original infection, and that the diagnosis must be considered when recurrent fever occurs in anyone who has been in a malarial area.

As an illustration they record the case of a man who had malaria in Burma in 1943 and also several relapses before he left for England in 1946. From 1946 to 1959 he suffered two or three relapses a year, each with one typical malaria sequence of cold and shivering followed by heat and sweating and finally prostration and weakness. In 1959 *Plasmodium malariae* were demonstrated in a thick blood film after one of these attacks. There were no physical abnormalities, neither liver nor spleen being palpable. There was no anaemia, and the white count was normal. Treatment by a course of primaquine diphosphate 25 mgm. three times a day for 15 days appears to have terminated the infection.

The authors suggest that relapses may be of two forms: those occurring after a short interval being due to exacerbations of a low grade parasitaemia; those occurring at longer intervals of several months (as in this case) being due to the release of exo-erythrocytic parasites into the blood.

[For a relapse after 45 years, see this *Bulletin*, 1956, v. 53, 851.]

A. C. E. Cole

REID, J. A. **Secondary Vectors, an Obstacle to Malaria Eradication.** *Med. J. Malaya.* 1960, June, v. 14, No. 4, 228–31.

In many countries malaria is transmitted by several species of anophelines of varying importance as vectors. Secondary vectors frequently are species having relatively little contact with man, and are thus perhaps less likely to be affected by house-spraying with residual insecticides than are the primary vectors. This paper emphasizes the importance of such secondary vectors.

The author briefly describes the malaria situation in Venezuela, where malaria due to the primary vector *Anopheles darlingi* has been eradicated, but malaria of low endemicity due to the secondary vectors *A. albimanus* and *A. nuneztovari* still persists in certain areas. The same sort of thing is likely to happen in parts of the South East Asia and Western Pacific Regions, including Malaya, where some of the vectors of malaria in flat land and coastal areas (*A. barbirostris, A. letifer, A. sundaicus*) are known to be less susceptible to insecticides than *A. maculatus*, the important vector of malaria in hilly areas. House-spraying alone may not be sufficient to stop the transmission of malaria in the flat lands, and spraying may have to be supplemented by drug treatment or by antilarval measures.

The author does not believe that failure to stop transmission is always due simply to failure to spray properly. "All practical means of attaining the maximum efficiency in spraying programmes must of course be used, but if good spraying stops transmission in the primary vector areas in a country, but the same standard of spraying does not stop transmission in the secondary vector areas, this seems evidence enough that it is the biology of the secondary

vectors that is the chief obstacle, and not inefficient spraying." These areas where infection persists constitute a menace to areas where malaria has been eradicated, and reinfection of cleared areas may be very difficult to prevent.

The author suggests that pilot eradication projects should include all the known vectors of a country, and that success should not be claimed unless transmission is clearly stopped in the secondary vector areas as well as in those of the primary vector. Countrywide control should be postponed until means of stopping transmission by secondary vectors have been found.

T. Wilson

SERVICE, M. W. **The Effect of Freetown Emulsion and *Tilapia* Sp. on Mosquito Larvae in Borrow Pits.** *J. Trop. Med. & Hyg.* 1960, Dec., v. 63, No. 12, 287–90. [18 refs.]

Kano is an ancient walled city in Northern Nigeria, with a population of 91,000. The wall, originally 11 miles in circumference, and the houses are of mud and laterite construction, and the use of this material on such a large scale has left an accumulation of borrow pits which cannot be filled or drained. Some, though not all, are covered with *Pistia stratiotes,* providing breeding sites for *Mansonioides* spp. Though these do not act locally as vectors of filariasis or yellow fever, they are voracious biters. Both overgrown pits and those without weeds breed mosquitoes, including *Anopheles gambiae,* freely.

This paper describes carefully controlled experiments on the degrees of control of mosquito breeding achieved by periodic spraying with a modified form of Freetown emulsion [its original composition is not given], by replacing kerosene by the cheaper gas oil and using a sixth of the original concentration of Izal, and by the introduction of *Tilapia* spp. as natural predators.

Supervised spraying with Freetown emulsion was equally effective in the presence or absence of weed, reducing the average larvae per dip from 3·43 to 0·06. *Tilapia,* probably *T. monodi,* were introduced into 11 pits, another 11 being observed as controls. The observed results were:

Group	*Mean of larvae per dip for all pits combined*	*SD*	*Maximum/Minimum of mean*
No fish, no weed	3·17	3·58	6·5/0·5
No fish, with weed	2·24	2·71	3·87/1·37
Fish, no weed	0·03	0·26	0·2/0·0
Fish, with weed	0·79	1·66	1·16/0·56

The effect achieved in the absence of weed is obvious enough. In the presence of weed, the difference between the means without and with fish is 1·45 and the standard of error of the means is 0·27, so that the reduction is significant. Since some of the pits are used for commercial fish farming [with the implication that the use of Freetown emulsion in them would be objectionable], there is a case for the use of predator fish. The paper concludes with a useful discussion, with references, on previous experiments with predators, *Gambusia* spp., eels, newts, ducks, frogs and toads.

B. B. Waddy

PALMIERI, C. Differenti gradi di sensibilità al DDT in femmine di *Anopheles atroparvus* ottenute da successive ovodeposizioni di singole coppie. [**Differences in Susceptibility to DDT in Female** *Anopheles labranchiae atroparvus* **derived from Successive Ovidepositions from Each Pair**] *Parassitologia.* Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 273–6, 1 chart. English summary.

Nine pairs (male and female) of *Anopheles labranchiae atroparvus* were set up in small cages and fed at regular intervals. The various egg batches were reared to adults and the females tested for susceptibility to DDT by exposure in small glass tubes treated with that insecticide. The average susceptibilities of mosquitoes from the successive egg batches are given by the mean mortalities of females from eggs of all the pairs combined. All 9 pairs contributed to the first egg batch results; 7 to the second; 6 to the third to ninth; and 1 to the tenth. The same experiment was repeated, but with 15 original pairs. The results are shown in a graph relating the mortality obtained to the successive egg batches. Both experiments gave rather similar results, *viz.* rather high kills for the first 3 egg batches; low kills in the fourth and fifth batches; gradually rising mortality in subsequent batches.

The author suggests that the susceptibility of adult mosquitoes may depend on which egg batch they are derived from.

[The data are open to doubt. It is not clear to what extent different females contributed to the progeny from each batch; perhaps the DDT-sensitive females tended to lay more eggs in the earlier batches and *vice versa.* The similar results of the 2 experiments are, of course, surprising.]

J. R. Busvine

GARMS, R. Insektizidresistenz bei *Anopheles.* [**Resistance to Insecticides in Anophelines**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 353–88. [Numerous refs.]

This is a very competent and comprehensive review, based on just over 200 references. The subjects covered are: the present extent of resistance among anophelines; the definition and terminology of resistance; determination of resistance and factors affecting such assessments; the origin of resistance in the laboratory and in the field and the genetic background; physiological mechanisms; "behaviouristic resistance"; possible methods of preventing or overcoming resistance. A table occupying 4½ pages lists findings of various workers throughout the world.

J. R. Busvine

BRIGGS, N. T., GARZA, Bettie L. & BOX, Edith D. **Alterations of Serum Proteins in Mice Acutely and Chronically Infected with** *Plasmodium berghei. Exper. Parasit.* New York. 1960, Sept., v. 10, No. 1, 21–7, 2 figs.

Because of the relatively high susceptibility of the mouse to infection with *Plasmodium berghei* it appeared to the authors a useful host in which to

measure serum protein changes during infection. Female mice weighing 17–25 gm. were inoculated intravenously with 1 million parasites of the KBG 173 strain. The course of infection was followed in stained films. When cure was desired, primaquine phosphate was given in the diet from day 6 to day 11 of infection. Groups of mice were used to obtain data on parasitaemia and serum protein composition (a) after primary infections (b) after cure and challenge (c) also after cure and a second challenge of chronically infected mice. Blood for serum analysis was collected from the tail at the desired interval after infection, along with that from control mice in 0·02 ml. amounts and examined electrophoretically (haemolysed blood being rejected). It was then stained with bromophenol blue before being scanned with a densitometer.

Results are recorded for the period of acute infection, for the period of challenge and also during chronic infection. It was found that during primary infections serum protein levels were markedly altered and the levels returned to normal after early treatment with a curative drug. Alteration in the serum-protein pattern accompanied by high parasitaemia occurred when the animals were reinfected. Disappearance of parasites from the blood about a week later was accompanied by a marked rise in gamma globulin, but frequent relapses took place and were usually of non-fatal character. The chronic state of infection was also associated with raised gamma globulin levels of varying degree. *J. D. Fulton*

DODIN, A. & COURDURIER, J. Specificité de *Plasmodium berghei* vis-à-vis de l'inhibition de la glycolyse des hématies de différentes espèces animales. [**Specificity of *P. berghei* regarding Inhibition of Glycolysis by Red Cells of different Animal Species**] *Arch. Inst. Pasteur de Madagascar.* 1960, v. 28, 147–51.

The authors have studied glycolysis *in vitro,* in a Warburg apparatus, by the red cells of different species of animals, namely mouse, rat, sheep, rabbit and man, in presence and absence of mouse cells parasitized by *Plasmodium berghei.* Infected and non-infected cells were collected in citrate and washed in buffer and mixed in known proportions in a standard volume after removal of white cells, so that the same numbers were used in each experiment. The QO_2 of normal cells, infected cells and of the two types mixed was determined.

In the case of the red cells of rats and mice (receptive hosts), as opposed to those of man, rabbit and sheep (non-receptive hosts), inhibition of glycolysis by normal cells occurred in presence of *P. berghei.* To investigate the mechanism of this inhibition lysed normal cells were used. It was then found that the glycolytic power of these lysed cells was unaffected by the schizonts of *P. berghei.* The authors believe that a surface phenomenon is involved and enzyme activity affected. Inhibition of glycolysis by the red cells of rats made resistant to infection by *P. berghei* also occurred in the presence of the parasite

[The abstracter is unsure of the significance of these results.]

[See also this *Bulletin;* 1952, v. 49. 757; 1956, v. 53, 1097.]

J. D. Fulton

SHERMAN, I. W. & HULL, R. W. **The Pigment (Hemozin) and Proteins of the Avian Malaria Parasite** *Plasmodium lophurae*. *J. Protozoology*. Utica. 1960, Nov., v. 7, No. 4, 409–16, 5 figs. [25 refs.]

In this study of the pigment and proteins of *Plasmodium lophurae*, pooled blood obtained from infected chicks in presence of heparin was centrifuged and the plasma and white cell layer removed. The mass of red cells was washed in a special buffer at *p*H 7·75 and saponin in buffer was then added followed by incubation at 39°C. for 15 minutes. More buffer was then added, and the whole centrifuged, the sediment being washed till the colour of haemoglobin was no longer present. Finally the parasite material accompanied by red cell nuclei was resuspended in buffer and deoxyribonuclease added. After incubation at 39°C. for half an hour a sediment was obtained by centrifugation and thoroughly washed. The purity of the preparation was checked by stained films, some erythrocyte nuclei being still present. The product was stored at –15°C. Pigment was freed from the bodies of the parasites by repeated freezing and thawing in buffer. The resultant pigment was centrifuged down, then extracted with borate and other buffers. Soluble parasite proteins remained in the supernatant after lysis.

The pigment after being made soluble by addition of urea to buffer was examined spectrophotometrically, and when considered along with its electrophoretic qualities appeared to be a protein-porphyrin complex resembling methaemoglobin but distinct from haematin. The soluble proteins of the parasite were analysed by electrophoretic and ultracentrifugal methods and while they resembled host haemoglobin were yet distinguishable from it. Experimental results indicated that the pigment of *P. lophurae* differed from other malarial pigments studied and while regarded as an iron-porphyrin compound, the nature of its association with protein is not clear.

[See also this *Bulletin*, 1956, v. 53, 1313, 1314.]

J. D. Fulton

SHERMAN, I. W. & HULL, R. W. **Observations on the Host Hemoglobin during** *Plasmodium lophurae* **Infections in Chicks.** *J. Parasitology*. 1960, Dec., v. 46, No. 6, 765–7, 1 fig.

During the course of avian plasmodial infections alterations in plasma proteins and haemoglobin content of the host red cell have been observed, as in other hosts. It has been reported that chickens possess 2 distinct haemoglobins as shown by electrophoresis (JOHNSON and DUNLAP, *Science*, 1955, v. 122, 1186). The present authors suggest that the presence of the two haemoglobins in different amounts might affect growth and reproduction of the parasite. The possibility was investigated by electrophoretic methods as was the question whether the parasite exerted an extracellular proteolytic action on haemoglobin. Analysis of chicken haemoglobin was therefore carried out before, during and after the peak of infection with *Plasmodium lophurae*. It was concluded that no detectable breakdown of red cell haemoglobin occurred outside the parasite body and that synthesis of haemoglobins proceeded normally in infected birds. *J. D. Fulton*

WEISS, Margaret L. & MANWELL, R. D. *In vitro* **Cultivation of** *Plasmodium elongatum* **in Duck Tissues.** *J. Protozoology.* Utica. 1960, Nov., v. 7, No. 4, 342–6, 2 graphs & 5 figs. [16 refs.]

Plasmodium elongatum, in contrast to other malaria parasites, is found in all blood and blood-forming cells of the passerine host. Infections of this type are therefore of more than usual interest because of their value in the study of host-parasite relationships, which may throw light on relapses, immunity and chemotherapy.

Infected tissues from different parts of the bird host were obtained and cultured in order to observe whether antibodies were elaborated against the type of parasite present. Culture of liver, spleen and marrow from infected ducklings was carried out in Porter flasks in a medium of 8 parts Earle's balanced salt solution to 2 parts chick serum in presence of penicillin and streptomycin at a temperature of 102°F. for 72 hours. Fresh medium of slightly different composition was added to each flask daily. During and at the end of the incubation period the small coverslips placed within culture flasks were stained and examined microscopically. Fresh bird hosts were at the same time inoculated to test the viability of the parasites which had originally been obtained from acute, chronic or mixed infections.

Best results in culture were obtained with a mixture of marrow and liver. There was a fall in numbers of parasites after 24 hours but those viewed at 72 hours were viable, virulent and of normal appearance. The incubation period was directly related to the size of the inoculum only when dosage was heavy. The results of inoculation of hosts with fresh material from tissues as well as from cultures led the authors to believe that parasites become modified after the acute stage of the infection has passed. This may possibly result from contact of the parasites with immune substances elaborated by the respective tissues [this *Bulletin,* 1957, v. 54, 1159; 1959, v. 56, 1010]. The authors believe that the invaded cells individually produce some intracellular substance which, while not interfering with parasite life and virulence, inhibits its multiplication.

J. D. Fulton

GARNHAM, P. C. C., BIRD, R. G. & BAKER, J. R. **Electron Microscope Studies of Motile Stages of Malaria Parasites. I. The Fine Structure of the Sporozoites of** *Haemamoeba* (=*Plasmodium*) *gallinacea. Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, May, v. 54, No. 3, 274–8, 12 figs. (11 on 3 pls.) [13 refs.]

The authors describe the structure of sporozoites of *Haemamoeba gallinacea* [=*Plasmodium gallinaceum*], as revealed by electron microscopic examination of sections of infected salivary glands of *Aedes aegypti,* which had been fixed in 1% osmium tetroxide, stained with 1% phosphotungstic acid and polymerized in epoxide resin mixture.

From a reconstruction of the pictures shown in the accompanying micrographs of sporozoites cut in different planes, their minute structure (represented in a diagram) appears to be as follows. The sporozoite measures about 9 μ in length; its body is invested in a double membrane, the outer one being corrugated, so that in surface view the body shows a longitudinal striation

terminating at the anterior end, where a depression leads to a cup-like organelle. Starting from the latter, a dark paired bilobed organelle about 1·4 μ long extends into the body, while along the periphery of the body there are 12 hollow fibrils, which—like the paired organelle—do not extend beyond the nucleus. Throughout the cytoplasm are scattered numerous mitochondria and occasional vacuoles, possibly containing lipid material.

In discussing the significance of these structures, the authors suggest that the 12 fibrils represent contractile elements, while the paired organelle has a secretory function, producing a proteolytic enzyme which enables the sporozoite to penetrate the host's cells. *C. A. Hoare*

AL-DABAGH, M. A. **Mechanisms of Death and Tissue Injury in Malaria. VII. Malarial Anaemia.** *J. Facul. of Med., Baghdad.* 1960, Oct., v. 2 (n.s.), No. 4, 141–61, 4 graphs. [Numerous refs.]

The author makes some observations on the general blood picture in malarial anaemia of man and monkeys and points out that the anaemia which occurs in birds as a result of this infection has not been so carefully studied. He has now investigated the blood picture in a number of avian infections by methods which he used earlier [this *Bulletin,* 1960, v. 57, 1245]. The parasites included *Plasmodium juxtanucleare, P. gallinaceum* (blood and sporozoite infections were used), *P. rouxi, P. elongatum* and *P. cathemerium.* The state of the blood vessels, the number, size and shape of red cells and haemoglobin content, also the presence of young forms are described as well as the numbers of the different white cells present. He concluded that lowered haemoglobin content and drop in number of red cells were proportional to the intensity of infection. Erythroblastosis was observed in some birds which recovered from infection and was more marked if quinine was given. Haemolytic anaemia, normocytic and normochromic in type, was observed in all the infections studied except in that due to *P. rouxi.* *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

COLONIAL OFFICE. **Colonial Research 1959–1960. Tsetse Fly and Trypanosomiasis Committee. Report for 1959–1960** [MULLIGAN, H. W., Chairman] (pp. 315–36). Cmnd. 1215. 381 pp. 1960. London: H.M. Stationery Office. [17s.]

There are two main reports presented here, one from the East African Trypanosomiasis Research Organization and one from the West African

Institute of Trypanosomiasis Research. There are also reports from the Territorial Departments and of research in the United Kingdom. All are very condensed and are best consulted in the original report.

In East Africa the change of emphasis in research is away from the aim of complete eradication of the tsetse and towards the productive maintenance of cattle, by the use of prophylactic drugs, in areas lightly infested with tsetse, and to investigations of epidemiological problems of the interaction between vector, parasite and vertebrate host. These investigations cover immunology, a detailed study of the distribution of man, tsetse and the human disease in the South Busoga fly belt, observations on the feeding behaviour and resting places of the vector species, and biochemical studies on the breakdown of nitrofurazone in the body and protein estimations of cerebrospinal fluid. Nitrofurazone has been used with limited success in the treatment of late cases of sleeping sickness refractory to Mel B, but studies on the toxic effects have led to observations on the mechanism of damage to the heart and nerves by toxic drugs. Mel W is also being tested. An attempt to control *Glossina morsitans* by discriminative clearing in Ankole, Uganda, has not been successful.

In West Africa [see also this *Bulletin*, 1960, v. 57, 1246] studies are continuing on the factors influencing infection in *Glossina*. No difference of infection by *Trypanosoma gambiense* in *G. palpalis* has been found between males and females, although infection rates decline with the age of the fly, and incubation temperatures of the pupae also affect the infection rate of the adult fly. Infection rates in flies were found to have a significant relationship to the absolute number of short-stumpy forms of trypanosomes in the blood of monkey hosts. Biometrical studies of trypanosomes of the *T. congolense* group are continuing, as also are studies on the pathogenicity of strains of this group to cattle, sheep and rats. Biochemical and biological studies are concerned with the immunology and drug reactions of the host, and the physico-chemical constitution of trypanosomes. There are also reports of drug trials in cattle and pigs. Mel W is being tested in the human population. Entomological investigations have been concerned with infection rates of tsetse in the field, especially in the *G. fusca* group, identification of blood meals, seasonal fluctuation in numbers and identification of nocturnal resting sites. About half the population of *G. palpalis* have been found to rest within 1 foot of the ground, whereas *G. morsitans* rests mainly above 7 feet.

Activities reported by the Territorial Departments are mainly concerned with drug trials, the feeding preferences of tsetse, and experiments in control by spraying resting sites. Trypanosomiasis transmitted mechanically by *unspecified* biting flies is reported as an important factor in restricting livestock production in the Nyasaland Lower River area.

A systematic investigation of the antigens of trypanosomes has continued at the Lister Institute in London and a soluble antigen (exoantigen) has been obtained from *T. brucei* in rats, which can provide active immunity. The antibody to the exoantigen has been found to occur naturally in cattle infected in the field.

[For 1958–1959 Report, see *ibid.*, 1960, v. 57, 685.]

B. R. Laurence

i. DEMARCHI, J. & NICOLI, J. Multiplication des trypanosomes humains africains en culture de tissus. [**Multiplication of African Human Trypanosomes in Tissue Culture**] *C.R. Soc. Biol.* 1960, v. 154, No. 2, 306–8.

ii. ———— & ————. La multiplication des agents des trypanosomiases humaines africaines en culture de tissus. [**Multiplication of African Human Trypanosomes in Tissue Culture**] *Ann. Inst. Pasteur.* 1960, July, v. 99, No. 1, 120–30, 1 fig. [16 refs.]

i. The authors describe the growth in tissue culture of *Trypanosoma gambiense* and *T. rhodesiense,* using strains maintained by serial passages through guineapigs, and, in the case of the former species, also two strains maintained in culture and one recovered from tsetse flies. The substratum consisted of monolayers of HeLa and HEP human epithelial cells grown in a hydrolysate of casein with 5% calf serum [see LÉPINE *et al.*, *Ann. Inst. Pasteur,* 1956, v. 90, 654; *Bull. Hyg.,* 1956, v. 31 (870)]. As a rule, the trypanosomes were inoculated into the first tissue subculture, while extraneous substances introduced with the inoculum were gradually eliminated in subsequent transfers. Abundant growth of the trypanosomes was obtained at 23°–31°C., but there was no development at 37°C. Subcultures were usually made every 6 days.

ii. The second paper is an amplification of the foregoing. Here the authors state that they were unable to isolate the trypanosomes in both tissue and conventional cultures from the blood of 6 patients. In tissue culture inoculated with about 30 trypanosomes, maximum growth (800–2000 organisms per ml.) was attained after 6–8 days. Morphologically the flagellates in tissue culture were similar to those in conventional media. It is noted that cultures isolated from strains maintained in laboratory rodents lost their pathogenicity, while those derived from cultures and the gut of tsetse did not become pathogenic. Since the trypanosomes failed to grow in Lépine's medium in the absence of cells, it is thought that these provide the necessary growth factors, including haematin.

The authors emphasize the necessity of studying the physiology of the trypanosomes in order to throw light on the loss of virulence and inability to grow at high temperatures, in which respect their behaviour *in vitro* is said to differ from that *in vivo.* [However, this statement is only partially true, for both the temperature requirements of the trypanosomes and their morphology indicate that the forms assumed by *T. gambiense* and *T. rhodesiense* in tissue culture correspond to their stages of development in the insect vector.]

C. A. Hoare

YAEGER, R. G. **A Method of Isolating Trypanosomes from Blood.** [Research Notes.] *J. Parasitology.* 1960, June, v. 46, No. 3, 288.

A description is given of a method for isolating and concentrating trypanosomes free of erythrocytes from the blood of infected animals. For this purpose, rehydrated Bacto-Phytohemagglutinin (Difco, Code 0528), which agglutinates the erythrocytes, is added to heparinized blood containing the

trypanosomes in amounts to produce a final concentration of 0·1 mgm. per ml. After the suspension is shaken, it is centrifuged at 1600 g for 10 minutes; the supernatant fluid, containing the trypanosomes, is removed and recentrifuged at 2800 g for 10 minutes to concentrate the flagellates, which are then repeatedly washed in Locke's solution and sedimented by centrifugation. The whole procedure is carried out under aseptic conditions with sterile reagents.

This method was used for isolating *Trypanosoma cruzi* and *T. gambiense*. Counts of trypanosomes in the original blood sample and in the suspension after isolation showed that 50–60% and 70–80% of the respective organisms were recovered. This method proved to be particularly suitable for the detection and concentration of trypanosomes in scanty infections. Moreover, the concentrated material can be preserved by freezing, cultivated or inoculated into animals. It is also suitable for physiological studies and preparation of antigens. *C. A. Hoare*

BURSELL, E. **Loss of Water by Excretion and Defaecation in the Tsetse Fly.** *J. Exper. Biol.* 1960, Dec., v. 37, No. 4, 689–97, 5 figs. [11 refs.]

MACHADO, A. de B. Nouvelles contributions à l'étude systématique et biogéographique des Glossines (Diptera). [**New Systematic and Biogeographical Studies of** *Glossina*] Reprinted from *Publicações Culturais Companhia Diamantes de Angola.* Lisbon. 1959, June 25, No. 46, 13–90, 33 figs. [Numerous refs.]

This publication is similar to the author's monograph on the *G. palpalis* group of *Glossina* [this *Bulletin,* 1955, v. 52, 17] in that it contains detailed descriptions, illustrations and discussion of the genitalia and the taxonomy of tsetse flies, but the field of study is here widened to cover a review of the species and varieties of the *fusca* group. The affinities of the species of this group are discussed with special reference to the structure of the genitalia, and it is concluded that *G. brevipalpis* and *G. longipennis* form a group with characters, perhaps primitive, in common with the *palpalis* group [see however *ibid.*, 1958, v. 55, 871].

Reproductive isolation and competition between *G. palpalis* and *G. fuscipes,* and between *G. fuscipes fuscipes* and *G. fuscipes martinii,* are also reviewed and described. In addition there is a critical catalogue of the tsetse flies of Angola, which now number 8 species and subspecies. *B. R. Laurence*

COLLOMB, H. & NANSOT, B. Les troubles mentaux dans la trypanosomiase humaine africaine. [**Mental Disorders in African Trypanosomiasis**] *Bull. et Mém. École Nat. Méd. Pharm. de Dakar.* 1959, v. 7, 282–90. [20 refs.]

The authors cite details of 8 West African patients who suffered from mental disorders due to trypanosomiasis acquired in that locality. The mental changes in these patients were so varied that they covered most types of mental disorder: there appeared to be no correlation between them and the different stages of the disease, its duration, or the treatment the individual patients had

received. Nevertheless an onset syndrome seemed to be common to these patients; this was associated with loss of concentration and insight, manifested by confusion, lack of concentration power and stupor, and by abnormalities in their emotional reactions.

This initial stage was succeeded by secondary changes, which bore a relationship to the personality of the individual patient and his social and cultural standing. Dementia was only a terminal development. The mental changes occurring in trypanosomiasis are in contrast to those seen in syphilitic general paralysis, in which there is slowly progressive intellectual deterioration progressing to dementia. Clinical examination and study of the electroencephalographic changes and of the anatomical lesions encountered in trypanosomiasis indicate the predominance of meso-diencephalic injury in this condition.

When treating patients suffering from the mental disorders caused by trypanosomiasis early correction of their invariably bad physical condition is essential and a proper nutritional state should be regained before any specific chemotherapy is introduced. In addition, the authors' work suggests that hormone [presumably steroid] treatment may be helpful for its anti-inflammatory action, so lessening the risk of the development of a fatal demyelinating encephalitis. *A. R. D. Adams*

HAWKING, F. & SEN, A. B. **The Trypanocidal Action of Homidium, Quinapyramine and Suramin.** *Brit. J. Pharmacol. & Chemotherapy.* 1960, Dec., v. 15, No. 4, 567–70, 1 fig. [11 refs.]

The three substances named in the title are slow-acting trypanocidal agents and an attempt has been made to study the course of events in *Trypanosoma evansi* and *T. congolense* while the drugs are acting. After the trypanosomes present in the tail blood of the rat or mouse host were counted, the animals were treated intraperitoneally with a dose of drug in about twice the amount which would cause disappearance of trypanosomes from the blood within 4 days. During the period trypanosomes were regularly counted.

From the results the authors concluded that *T. evansi* and *T. congolense* had a developmental period of 5 and 8 hours respectively, and the 3 drugs used allowed multiplication to continue for 24 to 72 hours. Depending on the nature of the drug treatment there followed a period when numbers of parasites remained constant, and was succeeded by a rapid fall in numbers. There appeared to be only slight absorption of drug by trypanosomes and *in vitro* activity on acting for 24 hours was slight.

The authors compare their findings with those shown by rapidly acting drugs such as trivalent arsenicals. They believe that the above drugs affect division by interference with a substance in the trypanosomes which is concerned in this process. Some morphological effects of the drug were also observed such as diminution of the number of dividing forms and the presence of multinuclear forms which had been unable to divide. *J. D. Fulton*

WILLIAMSON, J. & STEPHEN, L. E. **A Test for Drug-Resistant Trypanosomes in Experimental Tsetse-Fly Challenge of Cattle.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 366–70, 1 map.

A description is given of a test for drug resistance occurring among trypanosomes in the field, which has been found valuable in Nigeria at the West African Institute for Trypanosomiasis Research. Flies collected in the field are sent to the laboratory, usually by air in chilled thermos flasks. They are fed on 5 clean sheep in rotation, until the sheep show trypanosomes in the blood. When the blood has contained trypanosomes for 4 days each sheep is given one intramuscular injection of 0·25 mgm. homidium per kgm. After that the blood is examined daily for 60 days or until trypanosomes reappear. The presence of drug resistance is indicated by early relapse (occurring on the average in significantly less than 27 days). Trypanosomes from 5 areas in which much drug treatment had been given relapsed in 7–11 days. Trypanosomes from some areas when no drug had been used relapsed in only 1 out of 5 sheep, the relapse occurring after 21–40 days.

As to the species of trypanosome involved, among 41 initial infections produced by wild fly, 61% were *T. vivax*, 2% mixed *T. vivax* and *T. congolense* and 37% were *T. congolense*. In the trypanosomes which appeared at the relapse there was a preponderance of *T. congolense*. *F. Hawking*

STEPHEN, L. E. & GRAY, A. R. **Suramin Complexes. VI. The Prophylactic Activity of Antrycide-Suramin Complex and Antrycide Chloride against** *Trypanosoma simiae* **in Pigs.** *Ann. Trop. Med. & Parasit.* 1960, Dec., v. 54, No. 4, 493–507, 3 figs. [10 refs.]

MILCOU, S. M., HOLBAN, R. & SĂHLEANU, V. Les variations du contenu hormonal de la thyroïde et de l'hypophyse au cours de la trypanosomiase expérimentale du cobaye. [**Variations of the Hormonal Contents in the Thyroid and Hypophysis during Experimental Trypanosomiasis in Guinea-pigs**] *Rev. Sci. Méd.* Bucharest. 1959, v. 4, 57–9.

The English summary appended to the paper is as follows:—

"During experimental trypanosomiasis on guinea-pigs, the hormonal contents of the hypophysis and thyroid have been studied by the method of implants in tadpoles.

"Four days after the inoculation, a lowering in the metamorphogenic substances of the thyroid is observed. The lowering is even worse after 8 and 10 days. In the hypophysis, the metamorphogenic substances (thyreotropic hormone) suffer significant oscillations during this interval; 4 days after the inoculation their contents increase probably by intrahypophysial blocking."

DE FREITAS, J. L. P. Importancia de la enfermedad de Chagas para la salud pública. [**Public Health Importance of Chagas's Disease**] *Bol. Oficina Sanitaria Panamericana.* 1960, Dec., v. 49, No. 6, 552–62. [50 refs.]

A general review and discussion.

PIFANO C., F. Algunos aspectos de la enfermedad de Chagas en Venezuela. **[Some Aspects of Chagas's Disease in Venezuela]** *Gac. Méd. de Caracas.* 1960, Jan.–Mar., v. 68, Nos. 1/3, 5–43. [Numerous refs.]

This is a review of Chagas's disease in Venezuela, with special reference to its epidemiology, clinical manifestations and laboratory diagnosis. In Venezuela the disease is prevalent in rural areas, where the primitive palm shacks inhabited by the vector, *Rhodnius prolixus,* provide suitable conditions for transmission of the infection among human beings and their domestic animals. Of the total population of the republic, 40% (about 3 million) live under these conditions, but the true incidence of Chagas's disease among them is uncertain, nor is it known what proportion of the 4,800 cases of deaths from cardiopathy is due to this disease.

During the last 23 years the author diagnosed on parasitological grounds 1,876 cases of Chagas's disease, represented by 180 acute and 1,696 chronic cases. In a number of instances the incubation period was found to vary from 2 to 4 weeks. A detailed account is given of the clinical course and pathology of the acute and chronic forms of the disease. A number of instances are mentioned of transplacentary transmission of the infection to the foetus, and attention is drawn to transmission by blood transfusion. The latter can be prevented by applying the complement-fixation tests to the donors. Among the laboratory methods in use, xenodiagnosis proved to be particularly valuable. *C. A. Hoare*

DE LUCENA, D. T. Epidemiologia da doença de Chagas em Pernambuco. A reação de Guerreiro-Machado na determinação do nível endêmico. **[Epidemiology of Chagas's Disease in Pernambuco. The Guerreiro-Machado Reaction as an Indicator of Endemicity]** *Rev. Brasileira Med.* Rio de Janeiro. 1959, Dec., v. 16, No. 12, 864–6. [13 refs.]

The author describes the results of a serological examination for Chagas's disease carried out in the state of Pernambuco in Brazil. Out of 3,268 samples of sera examined by the complement-fixation test 14·88% were positive. Their distribution in 3 areas, correlated with the incidence of infection in local triatomine bugs, was as follows: Litoral-Mata (1,314 samples) 14·61% (bugs 13·2%), Agreste (1,544) 15·16% (bugs 9·55%), Sertão (409) 14·67% (bugs 14·81%). Positive reactions in various age-groups were as follows: 0–10 years (223 samples) 10·76%, 11–20 (1,093) 14·1%, 21–30 (826) 17·55%, 31–40 (567) 18·17%, 41–50 (330) 9·7%, 51–60 (162) 12·35%, over 60 (65) 12·31%. In Recife, out of 97 samples examined by the Guerreiro-Machado test 26·37% were positive. Finally, the author quotes results obtained in Timbauba, where 1,062 samples of sera were examined serologically, with positive reactions in 13·43%. *C. A. Hoare*

ZELEDÓN, R. Efecto de la prodigiosina sobre la respiración de la forma de cultivo de *Schizotrypanum cruzi.* **[Effect of Prodigiosin on the Respiration of Culture Form of *Trypanosoma cruzi*]** *Rev. Biologia Trop.* San José, Costa Rica. 1959, Dec., v. 7, No. 2, 211–15, 2 figs. [11 refs.] English summary (9 lines).

Prodigiosin has been shown to have an antibiotic action on a number of micro-organisms, including some haemoflagellates. Its trypanocidal effect on the culture forms of *Trypanosoma cruzi* has also been demonstrated [this *Bulletin*, 1953, v. 50, 918]. The present paper is devoted to a study of the effect of prodigiosin on the metabolism of this flagellate. Using manometric techniques to determine its effect on the respiration of the culture forms, the author found that at a concentration of 1·7 μgm./ml. the antibiotic inhibited 67% of the respiration of the flagellate in the presence of glucose and 95% in the presence of glutamine. At the end of 2 hours all the organisms in both media lost their motility. A fraction of the endogenous respiration was also inhibited by prodigiosin. *C. A. Hoare*

YAEGER, R. G. & MILLER, O. N. **Effect of Malnutrition on Susceptibility of Rats to** *Trypanosoma cruzi*. **II. Riboflavin Deficiency.** *Exper. Parasit.* New York. 1960, Oct., v. 10, No. 2, 227–31, 1 fig.

"Albino rats maintained for 13 weeks on a riboflavin-deficient diet did not exhibit a significant increase in susceptibility to *T. cruzi* infection. The slight increase in severity of infection as evidenced by cardiac damage and parasitemia was attributed to inanition rather than to deficiency of the vitamin." [See this *Bulletin*, 1961, v. 58, 38.]

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

HO-THI-SANG, KERBASTARD, P. & ZIEGLER, J. P. Observation d'un cas de kala-azar au Tchad. [**A Case of Kala Azar in the Chad Region**] *Bull. Soc. Path. Exot.* 1960, May–June. v. 53, No. 3, 413–15.

The authors record a case of kala azar in a nomadic child aged 5 years, found during the course of a malaria survey in the Republic of Chad. A blood film taken in February showed leishmaniae free and in the leucocytes. The child could not be traced again until April when the diagnosis was confirmed clinically. Unfortunately the parents were uncooperative and the child could not be followed up or treated, although the illness was severe. The authors comment upon these occasional sporadic cases and speculate on whether they may be commoner than is recognized but are perhaps detected only when they are severe. They refer to previous isolated cases in Chad [this *Bulletin*, 1953, v. 50 (496)] and in the Hoggar region [*ibid.*, 1956, v. 53 (1413); 1957, v. 54, 549]. The present patient was found 220 km. from Fort Lamy.

H. J. O'D. Burke-Gaffney

HERTWIG, F. & OBERDOERSTER, F. Beitrag zu einigen Problemen der parasitären Krankheiten in China. 2. Mitteilung. Kala-Azar. [**Problems of Parasitic Diseases in China. II. Kala Azar**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 4, 401–9.

A general account of epidemiological, clinical, therapeutic and preventive aspects.

See also this *Bulletin*, 1959, v. 56, 426.

ACTOR, P. **Protein and Vitamin Intake and Visceral Leishmaniasis in the Mouse.** *Exper. Parasit.* New York. 1960, Sept., v. 10, No. 1, 1–20, 7 figs. [28 refs.]

This study deals with the effect of host diet on visceral leishmaniasis in the mouse, and one strain of animals was used for the most part throughout. The parasite used was the Khartoum strain of *Leishmania donovani* maintained in the laboratory for some years in hamsters. Counts of parasites in liver and spleen were made by the method of STAUBER (*Leishmaniasis in the Hamster,* 1955, p. 76, New Brunswick, N.J.; Rutgers University Press). For infection an intravenous inoculation of 0·2 ml. spleen emulsion of known parasite content was given.

The basal diet, especially rich in vitamins, is described. The appropriate diet was started before or during infection of mice closely similar in weight in any one group and a check was kept on the manner in which it varied, as well as on the amount of food consumed. In the case of deficient diets appetite usually decreases and pair-fed groups as well as those on *ad-libitum* basal diets were maintained. In some cases vitamin deficiencies were produced by giving analogues subcutaneously, for example desoxypyridoxine and pantoyltaurine in the case of pyridoxine and pantothenate respectively. The effect of pyridine deficiency on the early and late course of infection was studied as well as pantothenate and thiamine deficiency induced at different times during the infection. The results are shown in tables and graphs.

Finally, the effect of different dietary protein levels relative to infection was investigated. The author found that a peak of infection in the mouse, which he regards as a good host for these studies, was followed by a low chronic infection, and dietary changes revealed small alterations in host susceptibility. The increased rate of appearance of parasites in mice made pyridoxine-deficient before infection was reversed by feeding them on the vitamin. When the deficiency was induced later in the infection parasite numbers again increased and did not fall so markedly after peak infection. Pantothenate produced a temporary lowering of the rate of increase of parasite numbers. Thiamine deficiency had little influence on the course of infection. With protein-free diets parasite numbers increased and this effect was reversed by correcting the deficiency.

[The whole paper represents a considerable amount of experimental work and the abstracter realizes that in this short summary it has been difficult to do justice to it.] *J. D. Fulton*

PIFANO C., F. Algunos aspectos de la patología comparada geográfica de la leishmaniasis tegumentaria en el trópico americano. [**Comparative Study of Cutaneous Leishmaniasis in Tropical America**] *Gac. Méd. de Caracas.* 1960, Jan.–Mar., v. 68, Nos. 1/3, 89–98. [19 refs.]

A comparison is made between the diverse forms of cutaneous leishmaniasis occurring in different parts of South and Central America. In addition to the "classical" South American type of the disease [*espundia*], which is prevalent in the equatorial forest zones and is characterized by destructive naso-bucco-pharyngeal lesions, there are types characterized chiefly by cutaneous lesions with rare involvement of the mucous membranes, *e.g., uta* in Peru and *ulcera de los chicleros* in Central America; and finally a purely cutaneous leproid form found in Bolivia and Venezuela. The various types of cutaneous leishmaniasis also differ epidemiologically, for natural infections of dogs are commonly associated with *uta,* but not with *espundia,* while nothing is known about reservoirs of the leproid form. The author suggests that *Leishmania brasiliensis* represents a complex species comprising biological races associated with various nosological variants of cutaneous leishmaniasis in the New World.

C. A. Hoare

FORATTINI, O. P. Novas observações sôbre a biologia de flebótomos em condições naturais (Diptera, Psychodidae). [**Further Observations on the Biology of *Phlebotomus* under Natural Conditions**] *Arquivos de Hig. e Saúde Pública* São Paulo. 1960, Sept., v. 25, No. 85, 209–15, 3 figs. & 1 graph. English summary.

In a previous paper [this *Bulletin,* 1955, v. 52, 27] the author has recorded the incidence and breeding places of domestic species of *Phlebotomus* in São Paulo, Brazil. The present paper compares the monthly numbers of *Phlebotomus* captured around houses with the numbers captured in a Shannon light trap in forest, between 1958 and 1960. There was greater variation in the monthly numbers of *Phlebotomus* around houses than in the forest and this is attributed to greater variations in microclimate in areas after deforestation, compared with more stable conditions in forest. *P. whitmani, P. fischeri, P. pessoai, P. migonei, P. shannoni* and *P. intermedius* were recorded from both the areas surveyed and formed 61%, 2·6%, 5%, 4·9%, 2% and 24·6%, respectively, of the total catch. The two areas showed a similar total species composition, but monthly numbers were variable and suggested some antagonism between *P. whitmani* and *P. intermedius* as dominant species.

B. R. Laurence

FORATTINI, O. P. Sôbre os flebótomos do território do Amapá, Brasil. [*Phlebotomus* **Species in the Amapá Region, Brazil**] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo.* 1959, June, v. 13, No. 1, 159–64.

The English summary appended to the paper is as follows:—

"The author gives the results obtained in *Phlebotomus* collections made at some localities of the Amapa Territory, Brazil, in December 1958 to April

1959. The more common species found were *P. amazonensis* Root, *P. squamiventris* Lutz and Neiva, *P. davisi* Root, *P. ylephiletor* Fairchild and Hertig and *P. paraensis* Costa Lima. Nevertheless, there is some evidence about the importance of *P. squamiventris* in local transmission of cutaneous leishmaniasis."

[See this *Bulletin*, 1959, v. 56, 1226.]

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ZDRODOVSKII, P. F. & GOLINEVICH, H. M. **The Rickettsial Diseases.** [Translated from the Russian by B. HAIGH, M.A., M.B., B.Chir.] pp. xii + 629, numerous illustrations. 1960. London. New York. Paris. Oxford: Pergamon Press Ltd., Headington Hill Hall. [£5 5s.]

Rickettsial diseases have been receiving a great deal of attention in the Soviet Union, and it is not surprising to learn that the first Russian edition of this work, published in 1954, was quickly exhausted. The second edition was issued in 1956 [this *Bulletin*, 1957, v. 54, 667], and this has since been revised and translated to form the first English edition.

The authors have made substantial contributions in the field, and their comparative studies have done much to clarify the interrelationships of rickettsiae isolated in the U.S.S.R. and in other parts of the world. Their book gives a comprehensive and well-ordered account of the pathogenic rickettsiae and the diseases which they cause. A general section (208 pages) deals with the characteristics of rickettsial organisms, and includes chapters on classification, morphology, arthropod infections, experimental infections, cultivation, serology and laboratory methods; this is followed by a special section (358 pages) containing chapters on the various rickettsial diseases and on chemotherapy, pathology, immunology and vaccine prophylaxis. Epidemiological and clinical aspects are well presented.

Although the Russian style of the original text is perceptible, the book is easy to read. This monograph is a very useful contribution, bringing together a large amount of up-to-date material in a clear and systematic manner; it can be recommended as a good source of information on the rickettsial diseases. *R. S. F. Hennessey*

SOMOVA, A. G., GERASIUK, L. G., AFANAS'EVA, M. K., SILAKOVA, E. I., AZAROVA, A. G., ALANIIA, I. I., KOSAREVA, A. V., SOLOV'EVA, A. V. & KRASNOVA, N. V. **Endemic Murine Typhus on the Black Sea Coast.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1960, v. 31, No. 2, 255–61. [11 refs.] [Translated from Russian.]

Complement-fixation tests on sera from 3,121 rats caught in Odessa during 1957 and 1958 were negative for antibodies to *Rickettsia mooseri*. Attempts

to infect guineapigs by inoculation of brain tissue from 190 rats were unsuccessful, as were attempts to isolate *R. mooseri* from rat-fleas.

During the same period, sera from 18 out of 875 rats caught in Batumi (where *R. mooseri* was first isolated in 1939) gave positive complement-fixation tests (titres ranging from 1 in 20 to 1 in 320) with *R. mooseri* antigens. Intraperitoneal inoculation of white rats with pooled ectoparasites from captured rats gave positive results (fever and development of specific antibodies) with 2 batches of fleas [5 species] and 1 batch of "ticks" [3 species of mites].

At Novorossiisk, sera from 264 rats gave negative reactions for murine typhus, but one isolation of *R. mooseri* was made by guineapig inoculation of pooled brain tissue from 5 rats. *R. S. F. Hennessey*

SHMELEVA, E. I. **The Effect of Cortisone on the Course of Rickettsial Infections of the Typhus Group in Experimental Animals—The Effect of Cortisone on the Course of Murine Typhus in White Rats and White Mice.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 10, 151–9. [Translated from Russian.]

White rats treated with cortisone (a single dose of 10 mgm. or 4 daily doses of 5 mgm.) showed increased sensitivity to intraperitoneal infection with *Rickettsia mooseri*. Deaths were numerous when the infecting dose was large. Rickettsiae multiplied more abundantly in treated than in untreated rats, rickettsiaemia was prolonged, and the development of complement-fixing antibodies was delayed. White mice treated with cortisone (single doses of 0·5–5 mgm.) also showed enhancement of rickettsial multiplication and died earlier than did untreated mice. These results agree with previous findings in guineapigs [this *Bulletin*, 1960, v. 57, 1255]. The extent to which resistance is reduced by cortisone depends upon the specific sensitivity of the animals to infection with *R. mooseri*. *R. S. F. Hennessey*

KULAGIN, S. M. **The Weil-Felix Reaction in Northern Asiatic Tick-Borne Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1960, v. 31, No. 2, 247–55. [26 refs.] [Translated from Russian.]

Weil-Felix tests on sera from 262 patients with Northern Asiatic tick-borne typhus gave the following percentages of positive results (agglutination at titres of 1 in 200 or higher) with *Proteus OX19* antigens: in the 1st week of illness, 18·5; in the 2nd week, 61·5; in the 3rd week, 88·8; and in the 4th week, 100. *Proteus OX2* antigens were agglutinated by sera from 15·2% of patients, and *OXK* antigens by sera from 2 patients only [tests with *OX2* and *OXK* antigens were performed on sera from 72 patients]; these results are regarded as group reactions, titres being lower and of shorter duration than those for *Proteus OX19* antigens.

It is concluded that the Weil-Felix test, "in view of its late appearance in the great majority of patients suffering from tick-borne typhus, has only retrospective importance for the diagnosis of the disease"; the test cannot

differentiate between epidemic and Northern Asiatic tick-borne typhus, specific serological tests with rickettsial antigens being necessary for this purpose.

R. S. F. Hennessey

PICCHI, J., NELSON, A. R., WALLER, E. E., RAZAVI, M. & CLIZER, E. E. **Q Fever associated with Granulomatous Hepatitis.** *Ann. Intern. Med.* 1960, Nov., v. 53, No. 5, 1065–74, 5 figs.

Although pulmonary symptoms and changes constitute the usual manifestation of infection with *Rickettsia burneti* in man, the authors report 3 examples of this disease in which hepatitis was the sole presenting feature. The patients were encountered in an epidemic of Q fever which occurred in Alameda County, California, in 1959.

This report begins with a useful review of the literature dealing with non-pulmonary manifestations of the disease, from which it appears that hepatic tenderness, with or without clinical enlargement, is to be found in about 18% of patients, with jaundice in 5% [this *Bulletin*, 1952, v. 49, 136]. These signs usually appear in the second or third week of the fever, and they usually portend a prolonged illness. When hepatitis is present, response to tetracycline therapy is often poor, yet among the few deaths reported in this disease, hepatic failure is not represented as a cause. Since the introduction of liver biopsy as a common clinical procedure, however, two previous reports have stressed the occurrence of a focal granulomatous hepatitis.

The 3 patients on whom this report is based were all adult white Americans, 2 males aged 44 and 52, and a female of 36. Each had been suffering from a febrile illness with marked general systemic disturbance for 1 to 3 weeks before admission to hospital, and 2 of them had become slightly jaundiced. In each patient there was definite tenderness on deep palpation below the right costal margin, but the liver was palpably enlarged only in 1. The spleen was not palpable in any of them.

Blood counts showed no constant or significant changes, but liver function tests showed aberrations in every patient. These comprised raised levels of alkaline phosphatase (max. 50 units), thymol turbidity (max. 18·6 units), cephalin flocculation (max. 4+) and serum globulin (max. 4·5 gm.%), while in 2 patients the icterus index rose to 16 and 18 respectively. These 2 patients also showed a prolonged prothrombin time and one of them an abnormal bromsulphthalein retention at the height of the illness. The diagnosis was made on the demonstration of a rising titre of agglutinating antibodies to *R. burneti* of 1 in 128 to 1 in 512 in 11 days in patient No. 1, a single titre of 1 in 512 on the 47th day in patient No. 3 and by a rise in complement-fixation antibody titre of 1 in 512 to 1 in 1024 in 7 days in patient No. 2.

Liver biopsy in each case showed miliary granulomata scattered throughout the parenchyma. Each consisted of an aggregation of lymphocytes, polymorphs and eosinophils, together with epithelioid cells which formed typical multinucleated giant cells in many of the lesions.

The authors thus add Q fever to the list of diseases which can cause miliary granulomata in the liver; this already includes tuberculosis, sarcoidosis, berylliosis, histoplasmosis, brucellosis, schistosomiasis, syphilis and leprosy.

All 3 patients here reported responded well to chloramphenicol.

J. H. Walters

KHAKHINA, Z. D., SOMOVA, A. G., SILICH, V. A., POLIAKOV, I. I. & GERASIUK, L. G. **Experimental Mixed Infection with Q-Fever and Brucellosis. III. The Pathology of Mixed Infection.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1960, v. 31, No. 2, 289–95, 3 figs. [Translated from Russian.]

This is a diffuse account of variations in histopathological reactions observed in guineapigs infected [apparently parenterally] with unspecified doses of *Rickettsia burneti* and *Brucella suis* given simultaneously or sequentially. Pathological changes in mixed infections were less marked than in separate infections, especially when animals were infected with *Br. suis* 1 month after infection with *R. burneti*.

[See also this *Bulletin*, 1956, v. 53, 306.] *R. S. F. Hennessey*

DENGUE AND ALLIED FEVERS

DOHERTY, R. L. & CARLEY, J. G. **Studies of Arthropod-Borne Virus Infections in Queensland. II. Serological Investigations of Antibodies to Dengue and Murray Valley Encephalitis in Eastern Queensland.** *Australian J. Exper. Biol. & Med. Sci.* 1960, Oct., v. 38, Pt. 5, 427–39. [29 refs.]

An abstract of this paper appears in the *Bull. Hyg.*, 1961, v. 36, May.

BURGDORFER, W.; EKLUND, C. M. **Colorado Tick Fever. I. Further Ecological Studies in Western Montana.** [BURGDORFER & EKLUND]. *J. Infect. Dis.* 1960, Nov.–Dec., v. 107, No. 3, 379–83. **II. The Behaviour of Colorado Tick Fever Virus in Rodents** [BURGDORFER]. *Ibid.*, 384–8, 2 figs.

I. This reports continued study in 1959 of areas studied in 1958 [this *Bulletin*, 1959, v. 56, 936]. In Area I, at 4,000 feet elevation, flag collections of *Dermacentor andersoni* showed it was abundant in April and early May but with the hot weather thereafter it became scarce. The ticks were ground up in pools of 1–5 and infection rates of 14–40% found. Virus was also isolated from 7 of 40 Columbian ground squirrels (2 of 25 in 1958), from 20 of 39 golden-mantled ground squirrels (20 of 44 in 1958) and from 5 of 29 chipmunks (0 of 9 in 1958). No virus was isolated from 6 pine squirrels and 2 hares.

In Area II, at 5,000 feet, ticks were numerous in May/June but no virus was isolated from them. Only Columbian ground squirrels were trapped but no virus isolated from 24. The golden-mantled squirrel did not occur in the area.

In Area V, at 6,000 feet, ticks were numerous even before the snow had disappeared and were active until late June; 18–21% of them were infected as were 1 of 15 Columbian squirrels (14 of 51 in 1958), 6 of 15 golden-mantled squirrels (8 of 17 in 1958) and 5 of 15 chipmunks (5 of 22 in 1958).

The golden-mantled squirrel was most heavily infested with immature ticks.

9 pools of ticks from viraemic animals were negative. All except 1 of the isolations of virus from golden-mantled squirrels were from animals born in 1959. 5 older squirrels had antibody. The area without golden-mantled squirrels, which appear to be the main hosts, was uninfected.

II. Wild-caught animals were tested for antibody to ensure susceptibility before infection. Most of the virus strains used were only in the first or second mouse passage. Columbian ground squirrels, inoculated with 4·3 and 7·3 log of virus, circulated virus for 23 and 33 days, with peak titres of 5 log 5 days and 24 hours after inoculation respectively. Golden-mantled ground squirrels inoculated with 4·3 and 6·5 log of virus had circulating titres of 3–5 log during the first 14 days, then decreasing amounts for a further 16 and 30 days respectively. Chipmunks inoculated with 4·3 and 6·5 log of virus had circulating virus titres as high as 4·7 log in the first 10 days and lesser amounts for a further 7 days. Deer-mice circulated 2–3 log of virus and continued circulating it for up to 30 days.

Infected nymphs of *Dermacentor andersoni* were fed on similar animals giving similar degrees and durations of viraemia except that there was no high initial virus level and circulation of virus did not reach its peak until the second week. The Columbian ground squirrel however circulated virus for only 16 days and titres never exceeded 1·7 log. Normal larvae and nymphs of *D. andersoni* were fed on these animals: those fed on a golden-mantled squirrel and on a chipmunk became infected and remained so through moults to nymph and adult. Those fed on the Columbian squirrel contained virus immediately after feeding but after moulting to nymphs and adults were not infected. This confirms previous work with hamsters that the threshold of viraemia necessary for infection of ticks is about 2 log. *C. E. Gordon Smith*

SILVER, H. K., MEIKLEJOHN, G. & KEMPE, C. H. **Colorado Tick Fever.** *Amer. J. Dis. Children.* 1961, Jan., v. 101, No. 1, 30–36, 1 chart. [28 refs.]

A general account with 4 illustrative case histories.

RABIES

BÖHM, H. Zur Inaktivierung des Virus fixe "Novi Sad". **[Inactivation of the Novi Sad Strain of Fixed Rabies Virus]** Reprinted from *Monats. f. Tierheilk.* 1960, v. 12, No. 5, 150–56, 2 figs. [21 refs.]

The rate of inactivation of the Novi Sad strain of fixed rabies virus by heat in the presence of phenol or formaldehyde has been studied. A centrifuged 40% suspension of infected rabbit brain in *p*H 7·4 buffered saline containing 0·5% phenol declined in titre by 2 log units during 96 hours at 22°C. and by 4 log units at 37°C.; at 56°C. inactivation was complete after

24 hours. Inactivation occurred somewhat more rapidly in a 10% brain suspension containing 0·04% formalin. *D. J. Bauer*

FENJE, P. **A Rabies Vaccine from Hamster Kidney Tissue Cultures: Preparation and Evaluation in Animals.** *Canadian J. Microbiol.* Ottawa. 1960, Dec., v. 6, No. 6, 605–9.

The SAD strain of fixed rabies virus was grown in hamster kidney cells grown in dialysis tubes for 3–4 weeks [this *Bulletin*, 1961, v. 58, 191]. Formalin was added to the culture fluid to 0·008 M and glycine to 0·02 M. After 6 hours at 37°C. the formalin was neutralized with sodium hyposulphite. Merthiolate [thiomersal] was added to 1:10,000 and this was the final vaccine.

25 rabbits were given 1 ml. of vaccine daily for 10 days. Blood samples were taken and all had neutralizing antibody demonstrated by an intracerebral test in mice. The 25 vaccinated rabbits and 18 controls were inoculated in the masseter with 8 log ICLD 50 for mice of street rabies virus obtained from the salivary gland of a naturally infected fox. All the vaccinated animals remained well and all the controls developed typical rabies. *C. E. Gordon Smith*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

KOROBKOVA, Y. I. & PAVLOVA, L. P. **Lysogeny in a Subculture of Plague Vaccine Strain EV (Girard and Robic).** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1960, v. 4, No. 3, 321–6, 8 figs. on 2 pls.

This paper reports that a particular culture of *Pasteurella pestis*, strain EV, which had been preserved in a sealed tube for some 5 years without being opened, was found, on subculture, to have undergone certain changes. Two colonial variants were isolated which differed from the parent strain, both of which showed great loss of immunogenic power indicating antigenic changes. Temperate bacteriophage was isolated from these variants which was active against heterologous strains of *P. pestis*, standard EV strains and the two variants. It is concluded that the standard EV vaccine strain is lysogenic and that it contains phage in the prophage stage but that normally the immunogenicity would not be affected. Transition from prophage to lytic phage, however, leads to dissociation of the strain and the emergence of variants with altered immunogenic properties. *H. J. Bensted*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

NICOLLE, P., GALLUT, J. & LE MINOR, L., with the technical collaboration of P. DUCREST, G. BRAULT & J. QUINIOU. Étude lysogénique, lysotypique, sérologique et biochimique (Cholera-roth et recherche de la lysine décarboxylase) d'une collection de vibrions cholériques et de vibrions El-Tor. [**Lysogenic, Phage-Typing, Serological and Biochemical Studies (Cholera-Red and Demonstration of Lysine-Decarboxylase) on Various Cholera and El-Tor Vibrios**] *Ann. Inst. Pasteur.* 1960, Nov., v. 99, No. 5, 664–71.

The strains of *Vibrio cholerae* examined in this study were isolated from various outbreaks of cholera in Indo-China, India, Egypt, China and Iraq during the years 1929–1954. The El-Tor vibrios came from the Hedjaz, Celebes and also from unknown sources. The method of phage typing and classification is not given in this paper.

All the cholera vibrios isolated in Indo-China were found to be lysogenic and most of them belonged to phage type VI. The lysine-decarboxylase (LDC) and cholera-red reactions were variable.

There were 33 strains from India, 14 from Egypt (1947 outbreak) and 1 each from China and Iraq. Most of these strains were found to be non-lysogenic and phage types V and VI were the commonest types and nearly every strain gave positive LDC and cholera-red reactions.

Of 11 El-Tor vibrios examined half were non-lysogenic and belonged to phage-type I. The LDC and cholera-red reactions were positive in all but one strain. *H. J. Bensted*

LAKSANAPHUK, P. & KEOPLUNG, M. **Clinical Study and Treatment of Asiatic Cholera in 1959.** *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 620–25, 1 fig. [22 refs.]

To appreciate the principles of treatment in cholera it is necessary to bear in mind the chief defects to be corrected. There is inflammation of the mucosa caused by the endotoxin of the vibrio which permits large amounts of transudative fluid, of high electrolyte and low protein content, to pour out into the intestinal lumen. The stools are alkaline and characteristic. Furthermore, the severity of the disease depends chiefly upon the extent of loss of fluid and electrolytes.

161 cases, all clinically typical, with marked dehydration, were studied and selected from 355 patients in Bangkok in February and March 1959. Most were admitted to hospital within 10 hours of onset of the disease. In age they ranged from 16 to 90; 54·1% were males. There were only 5 fatalities (3·11%). None died in the acute phase.

Of the stools cultured, 83·9% yielded positive results, and this high percentage was due to repeated rectal swabs.

The total daily oral dosages of drugs used were 3 gm. of phthalylsulphathiazole and 2 gm. chloramphenicol, given at 6–hour intervals. Kaolin suspension was given as a routine. No food was allowed in the first 24 hours. Rice water, milk and soft diets were introduced on the second day.

Although chemotherapy appeared inert from the clinical angle, it appeared to shorten the period of infectivity of the stools and probably served to reduce the number of carriers. Moderate vomiting was observed in 56·5% and cramps in 51 severely dehydrated patients. Fluid loss is not the sole cause of cramps, but probably that of sodium and calcium is more important. Rehydration was carried out initially with normal saline alone. 2% sodium bicarbonate solution or M/6 sodium lactate solution were recommended to correct acidosis.

Details are given of haematological and electrolytic studies.

For those with ischaemic renal complications, special fluid and electrolyte balance treatments were carried out by 20–50% glucose solution *via* gastric tube or caval infusion.

Uraemia and acidosis are the most serious complications in severe and fatal cases and occur as the direct result of prolonged shock and haemoconcentration due to massive loss of body fluid in the acute phase. Fatalities due to renal failure with uraemia are due to acute tubular necrosis after prolonged shock and haemoconcentration. Jaundice is of obstructive and hepatocellular origin and explains the fate of bile pigment in cholera [this *Bulletin*, 1958, v. 55, 38]. *Philip Manson-Bahr*

KRUATRACHUE, M., BURI, R., PHANICH, V., HARINASUTA, T., TRISHNANANDA, M., KOCHASENI, S. & PLENGVANIT, U. **Electrolyte Patterns in Cholera during Treatment: a Study of Twenty-four Cases.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 258–66, 2 figs.

24 adult patients, 10 males and 14 females, suffering from severe cholera were subjected to a careful biochemical investigation in Bangkok in 1959. This included daily estimations of serum sodium, potassium and chloride concentration, together with the plasma specific gravity.

Isotonic sodium chloride was the only solution used as "restoration fluid", and the initial volume required was calculated from the following table:—

SG of plasma	*Fluid used*
1·025–1·030	500 ml.
1·031–1·040	1,000 ml.
1·041 and over	1,500 ml.

In addition to this, "maintenance fluid" had to be given according to the estimated fluid loss in vomitus, faeces and urine, plus insensible water loss [one feels that the first three might have been measured]. When diarrhoea ceased, usually after 24 hours, because dehydration usually persisted venoclysis was continued but 5% glucose solution in distilled water was used in place of saline. At the same time oral potassium chloride, 4 gm. daily, and drinking water *ad libitum* were given, the amount drunk being measured. Even in the acute stage most patients managed to ingest rice to an average amount of 260 gm. daily, while in the convalescent stage each patient ate on the average 875 gm.

The initial estimations showed that the serum sodium concentrations were within the normal range in most subjects, the potassium level was normal in half but depressed in the remainder of the subjects, while the chloride concentration was normal in slightly less than half, but increased in the remaining patients. The plasma specific gravity was raised in every case, ranging from 1·031–1·048.

Under the treatment outlined above the serum sodium levels tended to fall, becoming transiently subnormal, but attained a normal concentration in most patients by the 8th day. Serum potassium concentrations fell to subnormal levels in every patient and restoration took longer, normal levels being reached only after 14 days; in some patients hypokalaemia persisted throughout the 20–day period of treatment. Nevertheless, characteristic symptoms of hypokalaemia were not noted. The authors suggest that persistent hypokalaemia despite treatment was in fact due to re-entry of potassium into the intracellular compartment under the influence of glucogenesis during glucose infusion.

The chloride concentration of the serum quickly became normal in every patient, but dehydration, as judged by the specific gravity of the plasma, persisted in most patients for 7 days, and in a minority for as long as 13 days.

No complications were encountered and no deaths occurred in this series.

[This simple treatment regime appears to have been adequate for the patients described, but one wonders whether really acutely ill patients, suffering from severe vomiting and acidosis, would have survived in the absence of infusion of additional alkali and potassium.]

[For earlier studies by these workers, see this *Bulletin*, 1961, v. 58, 62.]

J. H. Walters

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BOYD, J. **Some Observations on Human Amoebiasis.** *J. Trop. Med. & Hyg.* 1961, Jan., v. 64, No. 1, 1–13, 3 figs. [48 refs.]

This paper is the script of a lecture given by Sir John Boyd to the Danish Society of Pathologists and the Danish Society of Microbiologists. The author gives a clear and concise review of the main facts known about the natural history of *Entamoeba histolytica*, and emphasizes some of the essential requirements for a diagnosis of amoebic dysentery. The main part of the lecture is devoted to a discussion of the epidemiology of amoebiasis during which he gives an excellent critical analysis of the Chicago outbreaks in 1933 and 1934 [*Bull. Hyg.*, 1934, v. 9, 178, 315], the South Bend outbreak in 1953 [this *Bulletin*, 1955, v. 52, 777], and a brief reference to the R.A.F. outbreak in England in 1951 [*ibid.*, 1952, v. 49, 1117].

He reviews the evidence in support of the different theories which have been put forward to account for the variations in virulence of *E. histolytica* and

pleads for more research into the role of coincident bacterial infections and other potentially provocative agents. He concludes that amoebic dysentery is not and cannot be an epidemic disease in the accepted sense of the term, but that its sporadic incidence may be considerably increased by various incompletely understood factors.

This paper should be read by all those who would like a rapid, painless, and even enjoyable familiarization with modern concepts of the epidemiology of amoebiasis. *W. P. Stamm*

SZYMANSKI, L. & TEVA, Z. [**Amoeboma of the Colon**] *Harefuah*. Jerusalem. 1961, Jan. 15, v. 60, No. 2, [in Hebrew 37–43, 3 figs. (36 refs.) English summary 43.]

The English summary appended to the paper is as follows:—

"Four cases of ameboma of the colon are presented. Two of them were mis-diagnosed as acute appendicitis and operated. One case was correctly diagnosed without operation. One of the operated cases developed a fecal fistula which required closure by a second operation.

"Data from 19 other cases of ameboma collected from different hospitals are analysed and their clinical, diagnostic and therapeutic implications are discussed. Ameboma of the colon should be treated conservatively with anti-amebic drugs. Operation is advisable only as an emergency treatment for acute surgical complications or if medical treatment fails to prove the benign character of the lesion. During operation the possibility of amebic etiology of inflammatory tumors should be kept in mind. If any such suspicion arises, surgical activity should be limited to a minimum, because of danger of grave and even fatal complications."

LIESKE, H. & KIM, B. R. Erfahrungen über Diagnostik und Therapie von 25 Leberabszessen in Süd-Korea. [**Observations on 25 Cases of Liver Abscess in South Korea**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 4, 410–22. [Numerous refs.]

The English summary appended to the paper is as follows:—

"Symptoms, diagnosis, differential diagnosis, and therapy of 25 liver abscesses (18 of amebic nature and 7 pyogenic abscesses, the etiology of which was not verified) examined in South Korea are reported. Therapy was based on Resochin or Resotren treatment, puncture of abscesses, and application of antibiotics. 9 (36%) cases were surgically treated; 4 patients (16%) died."

LOUGHLIN, E. H. & MULLIN, W. G., in collaboration with L. ALCINDOR & Aurele A. JOSEPH. **Combined Antibiotic Therapy of Chronic Amebic Colitis with Oxytetracycline-Oleandomycin and Tetracycline-Oleandomycin.** *Antibiotic Med.* New York. 1960, Dec., v. 7, No. 12, 739–42. [10 refs.]

Two series of 100 adult patients with amoebiasis, more than three-quarters of them suffering from symptoms considered to be due to the condition, were

treated with antibiotic combinations. The diagnosis of an *Entamoeba histolytica* infection in every case was established by identification of the parasite in the stools. The effect of treatment was assessed by re-examination of the stools on the fifth and tenth days of treatment and once weekly thereafter up to the end of the sixth week.

The antibiotic combinations used were oxytetracycline and oleandomycin (2:1) or tetracycline and oleandomycin (2:1), both being given orally in capsules at a level of 1·5 gm. daily for 10 days. 96 of those treated with the first combination and 93 of those given the second remained parasitologically negative over the period of post-treatment observation. In the majority of each series symptoms ascribed to the amoebiasis were cleared; in the remainder they were only relieved, possibly because of permanent bowel damage despite clearance of the causative infection. There were no serious side effects from the treatment.

[There is no information as to where these patients came from, whether they ever had had acute amoebic dysentery, or what indeed were their symptoms.]

A. R. D. Adams

BROWN, R. L. **Surveyed Effects of Antibiotics and Quinacrine on the Prevalence of Amebiasis and Giardiasis.** *Antibiotic Med.* New York. 1960, Dec., v. 7, No. 12, 761–4. [19 refs.]

Stools from some 18,000 military patients, and a few of their dependents, in California were examined for intestinal protozoa by a variety of techniques. 6·04% were found to harbour *Entamoeba histolytica* infections, and 11·5% *Giardia intestinalis.* At least 13·5% of these patients had previously taken antibiotics for one reason or another; only 6 of the patients (0·035%) had been treated for amoebic dysentery. Mepacrine had been taken by 7·24% of the patients, mostly as an antimalarial prophylactic.

By comparison with the figures for the incidence of *E. histolytica* and *G. intestinalis* published by other workers in the United States since 1902 [these and the author's are set out in tables] the conclusion is reached that the incidence of both of these parasites has decreased by 20 to 25% following the patients' previous use of antibiotics and mepacrine. On considering the data the author convinces himself that the "Survey evidences suggest that quinacrine is a more lasting giardicide than antibiotics are amebicides".

A. R. D. Adams

ALMIRANTE, L., DE CARNERI, I., COPPI, G. & LOGEMANN, W. **New Amebicides: Unsaturated Amides related to Chlorophenoxamide.** *Antibiotics & Chemotherapy.* New York. 1960, Nov., v. 10, No. 11, 667–70.

The high activity of chlorophenoxamide (Mebinol) against *Entamoeba histolytica* both *in vitro* and *in vivo* and absence of activity against bacteria have been reported by the authors [this *Bulletin*, 1961, v. 58, 321]. The antiamoebic activity was believed to be associated with the dichlorocetamide group

of this compound. A diallyl- and some cinnamyl-derivatives were therefore synthesized, the former having the simple chemical constitution

$$(CH_2{=}CH.CH_2)_2 N{-}CO\ CH\ Cl_2.$$

Their *in vitro* activity against 3 strains of *E. histolytica* accompanied by a mixed bacterial flora was tested. Tests were also made on white rats infected intracaecally by the method of JONES [*ibid.*, 1947, v. 44, 313]. These substances although active *in vitro* were inactive *in vivo* and suggested to the authors that the phenoxybenzene group of the parent compounds was essential for *in vivo* activity. *J. D. Fulton*

PRUSS, J. Infektionen mit *Entamoeba muris-* und *Entamoeba histolytica-* Kulturen in Laboratoriums-ratten und die chemotherapeutische Beeinflussung *in vivo*. [**Infections with** *Entamoeba muris* **and** *E. histolytica*. **Maintenance in Laboratory Rats and the effect of Drugs** *in vivo*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 306–15, 1 fig. [Numerous refs.]

The author has previously reported success in culturing *Entamoeba muris* [this *Bulletin*, 1960, v. 57, 37] and has compared the value of this parasite and *E. histolytica* injected into the caeca of young rats as a means for testing anti-amoebic drugs. He has also studied the effect of diet on these infections. Known numbers of amoebae from culture were inoculated into rats of weight 20–30 gm. by the method of JONES [*ibid.*, 1947, v. 44, 313] so that each animal received 20,000–30,000 amoebae. On the fourth or fifth day after infection a suspension of the drug was given by mouth in a single dose, based on body weight. Hamsters naturally infected with *E. muris* were also used in the tests and the hosts were killed six days after treatment.

Only 3 of 62 rats failed to become infected with *E. muris*. The grade of infection with the two types of amoebae was similar but the course of infection was very different and ulcers due to *E. muris* were never seen. The severity of the infection depended on the number of passages this amoeba had undergone in culture, and cultures ceased to be infective after the 94th passage. *E. histolytica* cultures remained infective throughout. The author believes that the bacteria present in culture are partly responsible for these results. Injection of mice and hamsters by the above described route was not more successful than with rats. Diet is known to influence the numbers of infecting protozoa in the alimentary tract and a fare rich in carbohydrate favours them. This was shown in the case of two groups of rats on a high carbohydrate and high protein diet respectively. The former caused test animals to become susceptible again to *E. muris* but the grade of infection by *E. histolytica* was not influenced.

Treatment with Bemarsal (bis-[p-arsonophenylamino]-1 : 2 ethane) was found to affect both amoebae similarly *in vivo*. Further studies with rats experimentally infected with *E. histolytica* and hamsters naturally infected with *E. muris* gave comparable results with other amoebicidal drugs.

J. D. Fulton

YAWS AND OTHER TREPONEMATOSES

SOSA CAMACHO, B. Exploración histopatólogica y treponémica del higado en el Mal del Pinto. Estudio en 15 enfermos. [**Histopathological Study of the Liver in Pinta**] *Dermatología.* Mexico. 1960, June, v. 4, No. 2, 104–12, 6 figs. [18 refs.] English summary (8 lines).

The author examined 15 patients from an endemic zone of pinta in Guerrero State, Mexico. The patients were aged 20 to 75 years and the disease had lasted for 10 to 30 years. The object was to determine whether any visceral lesions could be found. In addition to clinical and serological examinations, histopathological studies of the skin and liver were made by special techniques.

All patients had the late disseminated form of pinta and the skin lesions corresponded with this. The liver, however, was normal in all cases and no treponemes were found in any of the biopsies. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

COCHRANE, R. G. **Leprosy: its Challenge and Hope.** 2nd Revision. 35 pp., 12 figs. on 4 pls., 1960. London: The Mission to Lepers, 7, Bloomsbury Square, W.C. 1. [1s.]

This booklet, published by the Mission to Lepers, is a revised edition and was originally published in 1949. It condenses into 35 pages a surprising amount of up-to-date information about leprosy, and is written in a clear popular style, easy for non-medical people to understand.

The first 7 pages deal with history and the means of spread of the disease, giving as an instance the case of a village of high caste Brahmins in South India where 5% were affected with leprosy, while in a neighbouring village of low caste labourers who worked for the Brahmins there was no leprosy, as caste customs prevented contact close enough to spread infection.

A short review is given of agencies engaged in the relief and control of leprosy, and the need of cooperation between governments and voluntary bodies (particularly Christian missions) is stressed.

There are sections on aetiology, immunity, tissue defence, signs and symptoms, and the most recent forms of treatment.

The last 10 pages are devoted to methods of conducting a campaign against leprosy, and such matters as institutional segregation, agricultural colonies, village segregation units, home isolation and out-patient centres. With regard to antileprosy laws 3 principles are laid down: legislation which cannot be

enforced is bad; legislation which drives the infectious patient from the street or place of work into his own home does more harm than good; while compulsion may be necessary in some cases, it should be used with the greatest caution.

Lastly, measures for prevention of deformity and disability and the use of physiotherapy and orthopaedic surgery are reviewed, the importance of rehabilitation being stressed.

[For anyone wishing to acquire a broad comprehension of the leprosy problem and what is being done to solve it, this booklet is highly recommended.]

Ernest Muir

See also p. 637, GONZÁLEZ **[Leprosy and Coccidioidomycosis in the Same Patient].**

RUGE, H. G. S., FROMM, G., FÜHNER, F. & GUINTO, R. S. **Serological Findings in Leprosy. An Investigation into the Specificity of Various Serological Tests for Syphilis.** *Bull. World Health Organisation.* Geneva. 1960, v. 23, No. 6, 793–802. [Numerous refs.]

It has long been realized that classical tests for syphilis (STS) often give falsely positive reactions with sera from leprosy patients. In order to assess the value of various tests these authors tested 327 sera, 318 from patients with lepromatous leprosy and 9 from borderline cases: the reactions employed were the TPI, CWR (cardiolipin), ordinary WR, Pallida reaction (PR, Reiter treponemes treated with ultrasonic waves), Meinicke (MKR II) and VDRL (cardiolipin).

Of the 327 sera, 31 (9·5%) were reactive with TPI and were considered syphilitic [though the authors admit that some at least were false positives]. 47 sera which gave a negative TPI showed some reaction with one of the other tests and 10 reacted with two of them; MKR II was positive in 19, VDRL in 15, CWR in 12, WR in 7 and PR in only 1; thus the PR was considered to be the most specific.

Reactions according to sex and age-groups are set out in 2 tables; results are of no great interest though it is worth noting that specific reactions (*i.e.*, positive TPI) increased steadily with age through the under 20 age-group (4%), 21–35 group (9·1%) and 36 years and over (16·9%); the corresponding figures for non-specific reactions were 18·4%, 10·5% and 9·1%. Tables also give details of specific and non-specific reactions according to the clinical status and bacteriological stage of the leprosy.

The authors discuss results obtained by others and the reasons for false positive reactions; these latter may be due to alterations in the albumin/globulin ratio or to absence of a normal "inhibitor" substance in the serum.

The part played by syphilis and yaws in this series is discussed fully; 23 of the 31 sera positive to the TPI test were considered to have given specific reactions. One of the cases could be attributed to syphilis and the other 22 were presumed to be yaws. Repeated TPI tests often gave varying results and this lack of reproducibility is stressed.

A note is appended showing that the Reiter treponeme was originally a true *Treponema pallidum.*

T. E. Osmond

CAMBIAGHI, O. Reação de Mitsuda em crianças de 5 a 13 anos de idade. Estudo comparativo entre comunicantes de doentes lepromatosos e não comunicantes de doentes de lepra. [**The Mitsuda Reaction in Children of 5 to 13 years of Age. A Comparative Study between those who have had contact with Lepromatous Patients and those who have had no such Contact**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, June, v. 28, No. 2, 77–90, 3 graphs. [17 refs.]

The author examined for the Mitsuda reaction 205 children who had been in contact with lepromatous leprosy, and compared them with 254 children of a municipal school as controls. The positive reactions (1-, 2-, and 3-plus) were 52·35% in the controls, and only 38·45% in the contacts. The controls with 1- and 2-plus were 50%, while among the contacts they were only 27·88%. The contacts with 3-plus were 10·57%, almost 5 times as many as among the controls (2·36%). Positive reactions among the female children were almost the same as those among the males in the control group (56·75% and 50·33% respectively), but there was a considerable difference in the contact group (50% and 36·66% respectively). The results of other authors are cited who have given different results from the above. *Ernest Muir*

SOUZA CAMPOS, N. Contribuição ao estudo clínico da lepra dimorfa. [**A Contribution to the Clinical Study of Dimorphous Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, June v. 28, No. 2, 61–9. [16 refs.]

The author writes from 20 years' experience during which "reactional tuberculoid" was classed as a form of the tuberculoid type. He follows this with details of the years 1953 to 1959 when, after the Madrid Congress, this form was classified as "dimorphous". During these latter years out of 12,910 leprosy patients examined 176 were clinically classified as dimorphous, that is 1·3%. Out of 58 submitted to histopathological diagnosis 24 were classified as dimorphous. In contrast to this, in another department, out of 160 biopsies of leprosy patients 34 were classified as reactional tuberculoid and 24 as dimorphous.

In order to end this confusion the author reviews in parallel columns, clinically, bacteriologically, histopathologically, immunologically and according to their evolution, the differences between the classical quiescent tuberculoid form and the so-called reactional tuberculoid. His general conclusions are that leprosy is a disease which externalizes itself clinically, that it has an evolutional prognosis which is indicated by the lepromin reaction, and that it varies between the poles of high and low resistance. Both the form once classified as reactional tuberculoid and that now called dimorphous should be included in a single group whether they are passing from an acute to a chronic phase or in the reverse direction. *Ernest Muir*

DE SOUZA, P. R. Contribuição ao estudo histopathológico da lepra dimorfa ("Borderline"). [**A Contribution to Histopathological Study of Dimorphous (Borderline) Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, June, v. 28, No. 2, 70–76. English summary.

This paper is to a large extent a contribution and confirmation of the former paper by SOUZA CAMPOS [see above]. He mentions that in over 18 years he has made 39,051 biopsies on leprosy patients, and found by histopathological evidence that 199 of them had the dimorphous form; only 28 of these cases had been definitely classified as dimorphous on clinical grounds. He agrees with Souza Campos that " reactional tuberculoid " should be merged with the dimorphous or borderline group, but objects to the latter terms as being foreign to Portuguese [Greek and English]. He suggests several alternatives with a preference for " interpolar ". *Ernest Muir*

GARG, K. N. **Chemotherapy of Leprosy: Current Status.** *J. Ass. Physicians India.* 1961, Jan., v. 9, No. 1, 27–35. [55 refs.]

ROY, A. T. **Treatment of Leprosy with SU–1906 (D.P.T.) (4-Butoxy-4' Dimethyl Amino Diphenyl Thiourea).** *Indian Med. J.* 1960, Apr., v. 54, No. 4, 84–6.

The author tested the therapeutic effects of SU-1906 (DPT) on 7 patients and gives the results obtained in 5 of them. All of these suffered from the lepromatous type of the disease. 1 to 3 gm. of the drug was given daily to adults to begin with, rising to 4·5 gm. which was tolerated well. The results of previous reports are confirmed [this *Bulletin*, 1958, v. 55, 524] that there is rapid clinical improvement for the first 4 months accompanied by a fall in the bacterial index, in this case an average fall from 4·35 to 2·92. After 24 months the average bacterial index had fallen to 1·2. Detailed description is given of a repeatedly reacting patient who made particular improvement under this treatment. It is found that reaction, common in some lepromatous patients with DDS, can be avoided with DPT. *Ernest Muir*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes;* NEMATODES (*hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

BARBOSA, F. S., CARNEIRO, E. & BARBOSA, I. **Manual de malacologia médica (trabalhos praticos).**

This book was reviewed on p. 395.

HUANG, Wen-Hsien, CHIU, Jui-Kuang & KAO, Chih-Tien. **[The Present Status of Intestinal Helminthic Infections among the Elementary Schoolchildren in the Central Part of Taipei, Taiwan]** *J. Formosan Med. Ass.* 1960, June 28, v. 59, No. 6, 385–98. [20 refs.] [In Chinese.] English summary.

In 1932, 81·0% and 62·2% respectively of schoolchildren in central Taipei city were found to be infected with *Ascaris* and *Trichuris*. Education and mass treatment reduced these figures to 53·6% and 37·8%, but the war disrupted sanitary conditions and intestinal parasites increased, so that in a survey in 1944 it was found that 65·3% of the schoolchildren harboured *Ascaris*. In recent years conditions have improved and mass treatment with " Macnin-S " (a combination of santonin and active ingredient of *Digenea simplex*) has been carried out again.

The present study was carried out in May to October 1959. A single stool specimen was taken from 2,375 pupils selected at random from 40,823 schoolchildren and examined by means of 2 direct smears and a flotation method. Eggs were counted in all positive cases.

985 (41·5%) of the children (aged 6–12) were positive for one or more helminths. The principal findings were *Ascaris* 19·2%, hookworms 2·5%, *Trichuris* 28·2% and *Enterobius* 59 cases. Evidently the infection rates have decreased strikingly. The average mean intensity of infection with *Ascaris* in 344 positive children was 8,815 eggs per gm. of faeces, which indicates about 9 adult worms. With hookworms, the intensity in 50 positive cases was 621 eggs per gm. or about 3 female *Ancylostoma duodenale* or 14 *Necator americanus*. With *Trichuris*, the intensity in 542 positive cases was only 399 eggs per gm. (despite the high incidence), which represents about 3 adult worms. All incidences were higher in boys than in girls and in Taiwanese than in those of mainland parents, probably because a relatively large number of Taiwanese pupils came from rural areas. *H. J. O'D. Burke-Gaffney*

MAFFI, M. Primo reperto nel Basso Oltregiuba, Somalia, dei molluschi d'acqua dolce: *Bulinus* (*Physopsis*) *abyssinicus* (Martens), *Bulinus* (*Bulinus*) *forskalii* (Ehrenberg) e *Lanistes* (*Meladomus*) *purpureus* (Jonas). Significato biologico ed epidemiologico. **[First Findings in a Survey of Freshwater Snails in Lower Jubaland, Somalia:** *Bulinus* (*Physopsis*) *abyssinicus*, *Bulinus* (*Bulinus*) *forskali* **(Ehrenberg), and** *Lanistes* (*Meladomus*) *purpureus*. **Their Biological and Epidemiological Significance]** *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 191–206, 1 map. [20 refs.] English summary.

The south-east corner of Somalia, where this investigation was carried out, has roughly the form of an inverted triangle with its base just south of the equator and its two sides abutting on Kenya to the west and the Indian Ocean to the east. Surface drainage flows from north-west to south-east along 3 main watercourses, which swell into torrents in the 2 rainy seasons and subside with the coming of dry weather. Dams have now been constructed to conserve the water for irrigation and other supply purposes, and these improvements are encouraging many families, who previously led a nomadic or semi-nomadic life, to settle with their large herds.

Maffi collected his molluscan specimens, mostly in August 1959, while engaged on a malaria survey and his tabulated summary of findings includes information on the type and character of each water collection—natural or artificial, clear or muddy, shaded or exposed to the sun, etc.—and its vegetation and the species of snail recovered.

Human infection with *Schistosoma haematobium* and cattle infection with *S. bovis* and their common intermediate host, *Bulinus abyssinicus*, are well known to be prevalent around the lower reaches of the Webi Shebeli and the Juba, but the author has now collected this molluscan vector further south and by the Kenya boundary across which it may also be present. The epidemiological significance of this is the potential risk of both human and cattle schistosomiasis arising, more especially now that an increasing population is coming to the area with their cattle.

The paper includes some comments on the morphology of the 3 molluscan species which the author collected and had identified. *J. Cauchi*

BARUFFA, G. & FRIEDHEIM, E. A. H. **Antimony Dimercaptosuccinate (TWSb) in the Treatment of Urinary Bilharziasis in Somalia.** *Central African J. of Med.* 1960, Nov., v. 6, No. 11, 485–7. [10 refs.]

The vector *of Schistosoma haematobium* in Somalia is probably *Bulinus abyssinicus*; this seasonally is abundant in the flooded areas around the Juba river; it is continuously prevalent in the permanently irrigated areas. Previous records have variously reported the incidence of haematuria in local groups of the population as being from 20 to 80% [see, for example, this *Bulletin*, 1956, v. 53, 1127]. In one area the present authors found 54 of 55 patients to be passing viable *S. haematobium* ova; 25 of these patients had gross haematuria. Tartar emetic, fouadin and anthiomaline treatments at various times have all proved unsatisfactory in view of the inhabitants' reluctance to attend for lengthy treatments; lucanthone (Nilodin), given for 3 days, did not cure patients of their infections.

TWSb, in view of its successful use elsewhere [see *ibid.*, 1958, v. 55, 664 and 665; 1959, v. 56, 1249] suggested itself as appropriate for a safe short-term ambulatory course of treatment under the prevailing conditions. 25 Somali patients (23 male) aged from 4 to 56 years, all living in a hyperendemic area of *S. haematobium* schistosomiasis and all infected with this parasite, were given intravenous or intramuscular injections of TWSb daily for 4 days. The drug was used as a 10% solution in normal saline. 0·4 gm. was given daily to 18 adults weighing 54–76 kgm., 0·3 gm. to 4 children weighing 12–29 kgm., and this same dosage to 3 adults weighing 43–50 kgm. All 25 patients were observed for at least 6 months, 19 of them for 9–10 months, and 4 for 12 months. From 6 to 13 urine re-examinations were undertaken in individual cases.

Local reactions to the injections were negligible. About one-third of the patients complained of some loss of appetite towards the end of treatment, and some had spikes of fever. 10 of the patients vomited 2–3 hours after the penultimate or last injections.

On the first day after treatment the miracidia were noticed to hatch slowly and to be deformed and sluggish. Thereafter dead miracidia became usual;

no hatching took place after the second week; haematuria stopped within the same period.

At 6 months the urines of 19 of the 25 (76%) patients were free from blood and from ova; the same obtained in the case of 17 of the 19 patients observed for 9–10 months, and in the case of 4 of the 4 watched for 12 months. The immediate response to the drug therefore was satisfactory. In some cases eggs reappeared and persisted in the urine some months after apparently successful treatment; reinfection was an obvious explanation. In other cases the eggs reappeared only temporarily for a short period; in these the explanation may lie in transient recovery from damage to ovarian function of the female worms as a result of treatment.

The immediate results, from every aspect, were satisfactory and were much superior to those obtained with previous treatments. A proper long-term evaluation of the effect of any treatment, however, is impossible in such a hyperendemic area as that in which the authors worked. *A. R. D. Adams*

MEYUS, H., CLERX, J. & EVENS, F. La bilharziose à *Schistosoma mansoni* du sud du Lac Kivu. [**Schistosomiasis due to** *Schistosoma mansoni* **in Southern Lake Kivu**] *Riv. di Parassit.* Rome. 1960, Sept., v. 21, No. 3, 165–98, 4 figs.

Schistosoma mansoni infections were found to be common among male adults on 3 inhabited islands in Lake Kivu, 59·5% being infected. In contrast, less than 7·5% of women and children were infected, and on the mainland surrounding the lake a sample survey among adult males showed only 11·2% to be infected. It is concluded that infection is generally acquired, as a fisherman's occupational disease, in the waters of the lake itself, though transmission does take place also in certain swamps. Out of all the thousands of snails examined, only *Planorbis* [*Biomphalaria*] *kivuensis* and possibly *P.* [*Biomphalaria*] *pfeifferi* were found to carry schistosomes of human type, and these two species are regarded as the sole carriers. They were found only where the lake waters are protected against the more violent prevailing breezes, and in swamps closely related to the main lake. They also require the shade given by aquatic plants. The percentage of *P. kivuensis*, the main vector, infected was only 0·69%.

The island inhabitants are well nourished, and their infections seem generally to be light. Only 4 men showed signs of illness attributable to schistosomiasis, one having hepatosplenomegaly with ascites, and 3 dysenteric symptoms. The situation was regarded, therefore, as that of a concentration of carriers, from which the disease could spread elsewhere.

A campaign against the disease included intensive propaganda against faecal pollution of water, anti-mollusc measures and treatment of patients. *Planorbis* snails (unlike *Bulinus*) can be totally eliminated from a locality by weeding of banks every 3 months, but this is an expensive procedure unsuitable for a large, lightly populated area. Sodium pentachlorophenate proved effective as a molluscicide. It was applied in powder form at a dosage of 110 gm./m.^{2}; applications every 3 months were necessary to prevent repopulation of sites in the lake itself, but in the swamps applications every 6 months were enough. Lucanthone hydrochloride (Nilodin) was used for treatment of patients. At

first the dosage scheme was 20 mgm./kgm. daily, divided into 2 daily doses, for 6 to 10 days. This regimen gave 60% cures; the usual side effects were common, but never serious enough to necessitate the interruption of treatment. Later a dosage of 750 mgm. daily in one dose for 20 days (amounting roughly to 12·5 mgm./kgm. to a total of 15 gm.) was tried. This was well accepted by the people, well tolerated, and cured 83% out of 324 persons on whom it was used.

The results are discussed in considerable detail and set out fully in 9 tables and 3 maps. *B. B. Waddy*

FUTTERWEIT, W. & SHOOKHOFF, H. B. **Relative Efficiency of Finger-Cot Specimens and Stool Examinations in Screening for** *Schistosoma mansoni* **and other Parasitic Infections.** *New England J. of Med.* 1960, Nov. 17, v. 263, No. 20, 1018–20.

The authors write from the Tropical Diseases Division of the New York City Department of Health, one of the functions of which is mass screening for schistosomiasis. There are more than half a million Puerto Ricans in New York City and the prevalence of *Schistosoma mansoni* infection among them is estimated to be 10% [this *Bulletin*, 1958, v. 55, 178].

The authors examined 46 out-patients chosen at random to test the observations of SPINGARN *et al.* [*ibid.*, 1960, v. 57, 489] that specimens obtained by digital examination of the rectum are useful as a screening method for detecting *S. mansoni* infection. Comparison was made between such a method, direct faecal smears and a sedimentation method based on that of HOFFMAN *et al.* [*ibid.*, 1934, v. 31, 778] except that 30 to 100 gm. of faeces were used instead of 1 gm.

The results are tabulated for 10 species of intestinal parasites. *S. mansoni* was found in 3 direct smears, 14 sedimentation tests and only 2 rectal finger-cot specimens: in these 2 there were 3 *S. mansoni* ova in one specimen and only 1 in the other. When these 2 specimens were concentrated, 50 and 22 ova were found, while the other 12 specimens positive by sedimentation yielded only 10 or less ova. Thus, these studies did not confirm the findings of Spingarn *et al.* It is suggested that this is a reflection of the relative inefficiency of the stool examination rather than of the efficiency of the finger-cot specimens. Spingarn *et al.* had used only 1 gm. of faeces in their concentration method while the present authors used not less than 30 gm: thus, in the latter case the sediment examined was derived from a larger initial amount of faeces.

The fact that the 2 specimens positive by the finger-cot method in the present study were those showing the higher egg count by sedimentation suggests that the finger-cot method is likely to yield positive results only when a sufficiently large number of eggs is present. *H. J. O'D. Burke-Gaffney*

ANDERSON, R. I. & NAIMARK, D. H. **Serologic Diagnosis of** *Schistosoma mansoni* **Infections. II. Sensitivity of Intradermal and Serologic Tests on Individuals with an Unequivocal Diagnosis of Schistosomiasis.** *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 600–603. [11 refs.]

As stated in the sub-title, both the intradermal and the serological tests were confined to patients in whom the diagnosis of *Schistosoma mansoni* was

indisputable and, in consequence, only persons in whose stools the eggs of *S. mansoni* had been demonstrated on one or more occasions were considered. In a group of 355 such persons the results obtained with intradermal tests were disappointing (75% positive, when using a cercarial antigen), as compared with the very high proportion (97%) of positives detected by standard serological tests. "Sensitivity of the complement fixation test was 97% with adult antigen and 96% with cercarial antigen. Comparable results were obtained in the cercarial slide flocculation (98%) and the cercarial agglutination (98%) tests. However, a relatively large number (21%) of weak reactions were obtained in the agglutination test. The circumoval precipitin procedure showed a sensitivity of 88%.

"All schistosome infections in the group of 355 patients, on whom all tests were performed, could have been detected serologically. A combination of either complement fixation test with the slide flocculation or agglutination test would have sufficed. In a like manner a combination of the slide flocculation procedure and the agglutination test would have detected all of the infections. The complement fixation tests and the slide flocculation test showed the greatest sensitivity."

[It seems reasonable to believe that many control sera, obtained from persons known not to have been exposed to infection, must also have been examined, but in the present paper no mention is made of such controls. This omission may be due to the fact that in a previous paper (this *Bulletin*, 1960, v. 57, 1282) the senior author, when using a cercarial antigen slide flocculation test, noted that the sera from 56 healthy persons were all negative.] *R. M. Gordon*

DAVIS, A. **Lucanthone Resinates in Schistosomiasis.** *Lancet.* 1961, Jan. 28, 201–2.

Lucanthone (Miracil D or Nilodin), a thioxanthone derivative, was the first oral effective drug in the treatment of schistosomiasis. A serious drawback to it is the severity of gastro-intestinal side effects, and indeed these may account for the relatively poor results obtained, for a twice daily dosage is needed to maintain adequate blood levels.

The author tried the effect of resinates of lucanthone to see if these would maintain adequate blood levels without unpleasant side effects. First experiments showed that Zeocarb 225 H resin of 1% cross-linkage produced adequate blood levels (more than 0·5 mgm. per 100 ml.) with 1 gm. of lucanthone base, but the 8% compound did not. Dosage with 1 gm. lucanthone equivalent of the 1% cross-linkage resinate twice a day for 3 days appeared to produce cures without troublesome side effects.

Further experiments suggested that a 2% cross-linkage resinate given in a single daily dose of 3 gm. the first day, 2 gm. the second, and 1 gm. the third maintained a satisfactory blood level for more than 5 days and was more effective than the 1% compound.

24 Africans with *Schistosoma mansoni* infections were treated with this course., 13 were free from ova after a month, but at the end of 3 months 7 only were still free. This was similar to the curative effect of 6 gm. of lucanthone hydrochloride but the incidence of nausea, vomiting, or pain was

very small with the resinate compared with the almost invariable side effects with the hydrochloride.

[Larger doses of the hydrochloride such as 12 gm. over 20 days have been recommended, and it may be that better results would be obtained with longer courses of the resinate.] *A. C. E. Cole*

NEVES, J. Tratamento quimioterápico da esquistossomose mansoni pelo novo composto tioxantônico (Prep. 17.581). [**Treatment of Schistosomiasis by a New Thioxanthone Compound**] *Rev. Assoc. Méd. Minas Gerais.* 1960, June, v. 11, No. 2, 109–18. English summary.

The drug used (1-β-diethylamino-ethylamino-4, 6, 8, trimethyl-azothioxonthone hydrochloride) has some affinities to Miracil D and was tested on 20 persons aged between 12 and 44 years, 8 of whom were in hospital and the remainder (4 of them being females) out-patients. The patients were selected as having active schistosomiasis, being in good clinical condition, and not having had previous anti-schistosomal treatment. In 3, faecal examination was negative, but in all rectal biopsy was positive.

3 schemes of treatment were used. (I) in the 8 hospital patients the drug was given at the rate of 20 mgm./kgm. body weight per day, as 0·25 gm. tablets 4–5 per day, thrice daily at the main meals for 5 to 6 days; (II) 5 out-patients received similar 0·25 gm. tablets 3 times a day for 10 days; (III) 7 patients received enteric-coated tablets of 0·20 gm. for the same period, but in addition "magno-gel" and vitamin B complex were also given. Tests of cure were faecal examination 30 days after, and rectal biopsy 3–4 months after the end of treatment.

The drug was badly tolerated by nearly all patients, especially those in scheme I; in some it had to be stopped after only 1 day's treatment and only 4 patients gave a satisfactory result.

The author considers that the toxicity of the drug considerably outweighs any clinical value it may have. *W. K. Dunscombe*

HERTWIG, F. & OBERDOERSTER, F. Beitrag zur einigen Problemen der parasitären Krankheiten in China. 1. Mitteilung. Schistosomiasis. [**Problems of Parasitic Diseases in China. I. Schistosomiasis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 324–35. [19 refs.]

As is now well known the Chinese health authorities are waging a well-organized war against *Schistosoma japonicum* infection. The present report concerns itself with several aspects of this disease which have been investigated comparatively recently by MAEGRAITH [this *Bulletin*, 1958, v. 55, 549].

Some special points emerge from this exhaustive publication. First, the large number of the final hosts of this parasite are listed. They range from man and his domestic animals (water-buffalo, horse, cattle, pigs, dogs, cats and sheep) to rats, skunks and even hares. The intensity of the infection in these animals depends, as in man, on the nature of their surroundings, especially in marshy terrain.

Here molluscs are capable of burrowing deep into the soil. In the province of Chekiang, in heavily infected areas, the top soil up to a depth of 2 cm. thickness was removed and a tally of the snails made out. Something like 40% were found in this situation and three-quarters of these were in the top 2 cm. layer. In the colder months of December and January it was proved that they burrowed to the depths of 14 cm., while in July the maximum was 6 cm. More were found in damp earth than in the dry. Infected snails shed their cercariae even when crawling over damp earth.

These habits render the eradication of the snail host extremely difficult. Attempts are made with hand-collecting as well as with molluscicides. Dibutylphthalate and benzylbenzoate are efficient as repellents against cercariae. Cypress-seed oil is also useful.

The pathogenesis, the quantity and location of the eggs produced by a certain number of worms, the number voided in the faeces and the pathological lesions produced have been studied.

In diagnosis the Chinese lay great emphasis on the value of the intradermal test which they consider as of high specificity. Antigen is prepared from the macerated adult nematodes as well as from the liver of experimentally infected rabbits.

Up to the present, antimony tartrate has been employed for treatment, but the less toxic products, such as ammonium-antimony gluconate and di-antimony-methyl-thiouracil oxide, are now being tried out and have given some favourable results. *Philip Manson-Bahr*

BIOCCA, E. Osservazioni sulla morfologia e biologia del ceppo sardo di *Schistosoma bovis* e sulla dermatite umana da esso provocata. **[Observations on the Morphology and Biology of the Sardinian Strain of *Schistosoma bovis* and on the Human Dermatitis which it provokes]** *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 47–54, 2 text figs. & 2 coloured figs. on pl. [17 refs.] English summary.

Cattle and sheep are often infected with *Schistosoma bovis* in Sardinia, and the inhabitants are sometimes affected with a dermatitis which is caused by the bifid-tailed cercaria of this helminth: this skin condition is more prevalent in summer. The cases occur in a number of coastal towns to the east and north-east of the island and it is here that the molluscan vector, which is *Bulinus truncatus*, is found. This snail is known to be intermediate host also to *S. haematobium* but urinary schistosomiasis has not yet been found in Sardinia and a watch should be kept against the risk of its introduction from other Mediterranean countries where the disease is endemic.

The author has reproduced this specific dermatitis on himself and other volunteers by allowing the cercariae of *S. bovis* to penetrate the skin. In no case has this experiment caused a systemic infection with the helminth in man.

The specific dermatitis which is here described has not been reported from other countries where *S. bovis* is also prevalent and it has been suggested that the Sardinian strain of this helminth might be a distinct variety. The author has, however, failed to detect any differential characters in these Sardinian strains of the cercariae though he has carefully studied their flame cells; he

has experimentally infected laboratory animals and has noticed no difference in the life cycle of Sardinian strains of the helminth. *J. Cauchi*

YOKOGAWA, S., CORT, W. W. & YOKOGAWA, M. **Paragonimus and Paragonimiasis.** *Exper. Parasit.* New York. 1960, Sept. & Oct., v. 10, Nos. 1 & 2, 81–137; 139–205. [Numerous refs.]

SADUN, E. H. & BUCK, A. A. **Paragonimiasis in South Korea—Immunodiagnostic, Epidemiologic, Clinical, Roentgenologic and Therapeutic Studies.** *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 562–99, 27 figs. [77 refs.]

Paragonimiasis is a serious hazard to health in parts of the Far East; of these Korea is the most intensively infected country. The infection was prevalent among Koreans held as prisoners-of-war in recent years. In one survey 8% of 35,000 Koreans were shown to harbour *Paragonimus westermani;* the infection also is recorded in dogs and cats, pigs, tigers and leopards, foxes and wolves in Korea.

The population of the Republic of Korea is about 22 million, primarily rural. The standards of life in all respects are low and medical facilities are inadequate. The usual diet consists chiefly of polished rice, which provides 91·75% of the calories consumed; meat accounts for 0·1% and crustaceans 0·47%. There is the heavy incidence of the intestinal protozoal and helminthic infections to be expected under such conditions; malaria also is a major public health problem. *Clonorchis sinensis* infection is present to a degree comparable with that of *P. westermani.*

During 1957 and 1958 studies on paragonimiasis in South Korea were undertaken by workers from the U.S. Army Medical Centre, Japan, the German Red Cross Hospital, Pusan, and the Walter Reed Institute of Research. A first aim was to determine where intradermal testing with purified antigens was reliable for epidemiological surveys; it was also hoped to add in general to knowledge of the disease.

Some 3,000 persons from 2 provinces in South Korea were interviewed to ascertain their modes of life, dietary, and records of illness and its details. All of them were tested with *P. westermani* antigens, and those giving positive reactions were examined in more detail for infection with this parasite. The antigens used and the details for performance and interpretation of the test have been described elsewhere [see this *Bulletin*, 1959, v. 56, 852, 853 and 1254]. In addition to a test with *Paragonimus* antigen, simultaneously on each patient a parallel skin test was done with a *Clonorchis sinensis* antigen, and also a control with the solution in which these antigens were suspended. Every patient with a proved *P. westermani* infection gave a positive skin test with the homologous antigen; only 3 patients of 91 apparently free of trematode infections failed to give clear negative reactions to *Paragonimus* antigen. Some cross-reactions were observed between cases of *Paragonimus* and of *Clonorchis* infection; where double infections occurred both antigens gave positive reactions, that to the *Paragonimus* antigen being greater than that to *Clonorchis* antigen. In those patients with *Paragonimus* infection alone in which a

reaction to *Clonorchis* antigen also developed, this latter was slight. In those cases of *Clonorchis* infection alone the reaction to the homologous antigen was more marked than that to the heterologous antigen. Therefore a reaction to a homologous antigen usually could readily be distinguished from one due to a heterologous antigen and there was little difficulty in correct interpretation of the skin tests in *Paragonimus* infection; in patients with double infections, however, some true *Clonorchis* reactions probably were missed. In 40% of those giving a positive test with *Paragonimus* antigen one single sputum examination confirmed the diagnosis by yielding eggs. There appeared to be a direct relationship between the weights of the infections and the intensities of the reactions to the skin tests.

Of the populations in the 2 provinces studied, in one (Cheju-Do) there was much paragonimiasis and little clonorchiasis; in the other (Kyong Sang Nam Do) both infections were prevalent. In Cheju-Do freshwater crabs and crayfish were eaten by people living away from the coast but in coastal villages, where the population chiefly dwelt, sea crabs were eaten in their stead; the incidence of paragonimiasis was reflected by these facts. In Kyong Sang Nam Do, largely a delta in which rice was grown, freshwater crabs and crayfish were found only in mountain streams but not in the main river; in the latter fish infected with the metacercariae of *C. sinensis* were common. The intensities of paragonimiasis and of clonorchiasis, as expected, were related to these facts.

Infections with *P. westermani* under all conditions and at all ages were more common in males than in females; their incidence was greatest between the ages of 25 and 35 years, when the intensity of infection also was highest; thereafter it declined. A symptomatic infection was observed most commonly in the youngest age-group (5–14 years); thereafter the frequence of symptomatic infections rose sharply. Blood staining of the sputum was at all ages the most frequent sign; and pulmonary symptoms usually were manifest by the third month after infection. In addition to pulmonary lesions, identifiable by radiography and tomography, lesions could by the same means be identified in the brain; genito-urinary, abdominal, subcutaneous, renal and testicular lesions were identified on biopsy or autopsy. Pleural effusion and empyema may be due to paragonimiasis, but they also can arise from pulmonary tuberculosis which is common; the usual staining method for acid-fast bacilli destroys the *Paragonimus* eggs on the slide and so renders them unrecognizable. The incidence of positive *Paragonimus* skin tests was greater in those with pulmonary tuberculosis than in others. Eosinophilia up to 25% was usual during the early stages of infection with *Paragonimus*.

Treatment early in the disease (within the first 2 years) with chloroquine is likely to be more effective than later (after 5 years), but the results are always uncertain. The drug was given by mouth, intramuscularly, by inhalation and by intrapleural instillation; these routes were variously combined in order to achieve as high a concentration of the drug at the site of the lesions as possible. Surgery is an alternative, and often the best, form of treatment. Of 116 patients treated with more than 40 gm. of chloroquine only 12·5% appeared to be freed of eggs 6 months later. Increasing the dosage to 100 gm. of chloroquine did not increase the apparent cure rate. Those patients who appeared really to benefit from treatment gave intradermal tests of reduced intensity following it; this is probably of significance.

[This paper contains much information which has already been published by the authors elsewhere. Nevertheless its collection into one paper, in conjunction with a comprehensive bibliography, makes it of considerable value to those interested in the subject.] *A. R. D. Adams*

HSIEH, Hsien-Chen, YUAN, Jen-Chuan, SHIH, Cheng-Chung, CHOW, Lien-Pin & CHEN, Tien-Shian. **A Study of Paragonimiasis by the Use of Intradermal Tests and Stool Examinations.** Reprinted from *Formosan Sci.* 1960, June, v. 14, No. 2, 55–65, 1 fig. [34 refs.]

In 1959, the authors made a survey for paragonimiasis in a village of 1,053 people, situated along the Chung-Kang river in Taiwan: this village was formerly a highly endemic area of the disease. All the people are engaged in cultivation of rice and tea. They catch freshwater crabs from the river and its streams, especially in December and January, and are in the habit of eating the crabs uncooked.

Stools were examined by the AMS III technique and by the MIFC method [this *Bulletin*, 1955, v. 52, 700]. A preliminary study on 30 cases of proved pulmonary paragonimiasis showed that there was no statistical difference between the two methods of stool examination.

Intradermal tests were made with a 1 in 10,000 concentration of an ether-saline extract of *Paragonimus westermani*, of which 0·01 to 0·02 cc. were inoculated into the volar surface of the forearm. The diameter of induration was measured at once and again after 15 minutes: increases of diameter by 5 mm. or more, by 4 mm., and by 3 mm. or less, were considered respectively as positive, doubtful and negative.

Some observations were also made on the size and number of the eggs in the stools. The average measurements were $81{\cdot}4\mu \times 50{\cdot}6\mu$. In the 17 cases specially studied, the number of eggs varied from 2 to 42: as numbers are liable to be small, thorough search of stools should be made. All the findings are shown in 5 tables.

Stool examination in 238 persons yielded 35 (14·71%) positive results. No eggs were found in 23 children under the age of 4 years, but thereafter there was no significant difference among the age-groups. Males (19·51%) showed a higher positive rate than females (9·57%).

Intradermal tests were done on 359 persons. The rates increased from 6·98% at 0–4 years to 73·68% at 50 years or more with an average of 40·39%: there were 53·32% negative and 6·41% doubtful reactions, with no significant differences between the sexes. 238 persons were examined by both tests. Of the 35 positive for eggs, 31 had positive intradermal reactions [shown as 88·57%]: the recovery rate of eggs in this group was 31 of 100, among the doubtful reactors 2 out of 14 and among the negative reactors 2 out of 124. Evidently a combination of the intradermal test and stool examination by the MIFC technique is useful in mass surveys for paragonimiasis. It is added however that among the positive reactors to the intradermal tests "a *Clonorchis* case was found" [presumably by stool examination] and stools and sputum were negative for *Paragonimus* eggs: it is assumed therefore that cross-reactions may occur.

A final table lists the findings in stool or sputum or both in 7 previous surveys. The positive results ranged from 1·26% to 38·4%.

H. J. O'D. Burke-Gaffney

WATTEN, R. H., KUNTZ, R. E. & LIU, H. Y. **Use of Purified Antigens for Detection of** *Paragonimus westermani* **and** *Clonorchis sinensis* **in Peoples of Hsinchu Hsien, Taiwan (Formosa).** *J. Formosan Med. Ass.* 1960, June 28, v. 59, No. 6, 364–9, 1 fig.

From November 1958 to March 1959 the authors, from a U.S. Navy Research Unit (NAMRU-2), made a field study in Taiwan for *Paragonimus* and *Clonorchis* by skin tests with the purified acid soluble fractions of these worms prepared by SADUN *et al.* [this *Bulletin*, 1959, v. 56, 852, 853]. The area, Hsinchu Hsien in the north-west coastal area, is endemic for paragonimiasis. The people are mainly cultivators of rice. 1,470 persons, children and adults, were examined. 10 groups were studied in 5 villages within 15 miles of Hsinchu and this included a group of aborigines in a wooded mountainous area. The people in all groups were given to eating crabs.

Each person was tested with both antigens and a saline-merthiolate [thiomersal] control on different parts of the volar surface of the right forearm. Tests were read after 15 to 30 minutes. Tests were regarded as positive if the area of induration was 80 sq. mm. and 3 times larger than the control: reactions larger than 80 sq. mm. were judged positive if they were twice as large as the control. Sputum and faecal specimens were also tested.

Local crabs, *Eriocheir japonicus*, were examined. Of 576 crabs examined during the study period 6·8% were positive for *Paragonimus* but the number of metacercariae per crab was only 1 to 4. Later in the year 1959 and in early 1960, 682 more crabs, collected mainly from small streams near the test villages, were also examined. The percentage positive in 5 villages varied between 0 and 10·8%.

The results of the intradermal tests are tabulated. 12·2% of the subjects were positive to *Paragonimus* antigen and 8·5% to *Clonorchis*. Positive findings increased with both antigens at ages 10–14 years, then decreased until 25 years, after which there was a gradual increase.

The average area of induration (in sq. mm.) in reactors was as follows:

Material	Mean Size of Reaction	
	Positive to *P. westermani*	Positive to *C. sinensis*
Paragonimus antigen	206 mm.^{2}	72 mm.^{2}
Clonorchis antigen	93 mm.^{2}	113 mm.^{2}
Saline control	38 mm.^{2}	37 mm.^{2}

In 27 patients harbouring eggs of *P. westermani* the skin reaction to the antigen averaged 204 sq. mm. while the reaction to *Clonorchis* antigen was

only 104 sq. mm. and these values indicate the degree of specificity obtained with the acid-soluble fractions.

Eggs of *P. westermani* were recovered from 27 of 179 persons giving positive skin reactions. Only 2 of these isolations were made from sputum; it is suggested therefore that the sputum specimens obtained were mainly saliva. The authors discuss the low recovery rate of *Paragonimus* eggs from positive skin reactors. This is a common experience when a single sample is examined; also a positive skin test may not necessarily indicate an active infection.

About one-third of the people admitted eating raw or pickled crabs or fish and 20% of these gave positive skin tests to *Paragonimus* antigen: positive tests were also obtained from more than half of 40 persons with a history of haemoptysis.

Eggs of *C. sinensis* were found in only 3 reactors to the homologous antigen. This low recovery rate with the unexpectedly high rate of skin reactors may indicate a higher incidence of cross-reactions with *Paragonimus*. Further studies are planned in areas endemic for *Clonorchis*, with more intensive efforts to recover eggs.

The authors believe that the finding of cases of paragonimiasis is a localized phenomenon related to the availability of crabs and a satisfactory life-cycle relationship for the parasite. They consider that purified skin testing antigens are useful for screening *Paragonimus* and *Clonorchis* infections in endemic areas.

H. J. O'D. Burke-Gaffney

MOORE, D. V. & CONNELL, F. H. **Additional Records of *Dipylidium caninum* Infections in Children in the United States with Observations on Treatment.** *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 604–5.

HUTCHISON *et al.* reported a human case of *Dipylidium caninum* infection in Mississippi and considered it to be the ninth case recorded from the United States [this *Bulletin*, 1960, v. 57, 149]. The present authors, from the University of Texas Southwestern Medical School, report 4 more. All were in children, aged respectively 27 months, 24 months, 4 years and unstated: they lived in Florida; Houston, Texas; Lewisville, Texas; and Louisiana. In each case, the parents had sought medical advice because of the presence of proglottids in the stools.

The first child was the only one with manifest symptoms, namely irritability, anal itching and severe abdominal pain: she had failed to gain weight. The diagnosis was not made correctly for more than 2 months, when the specimens were brought to one of the authors who found 50 to 75 active proglottids of *D. caninum* in the stools. At first, no eggs or egg capsules were found, but the interesting point is made that when the walls of the container were scraped (the specimen had been 2 days in the refrigerator) typical eggs and egg capsules were found. The proglottids had apparently crawled up the side of the container, disintegrated, and left the eggs on the walls. Diagnosis is usually made by finding proglottids in the stools: the practical importance of examining the walls of the container is therefore emphasized. The patient was treated successfully with atabrine [mepacrine]: she gained weight, symptoms disappeared and the stools have remained free of proglottids for 8 months.

One other patient had vague abdominal discomfort, and the other two had

no symptoms. Two were treated successfully with atabrine and the third with dithiazanine iodide: in this case the proglottids disappeared after one day of treatment and the worms were apparently digested *in situ*.

All 4 patients had had close contact with dogs.

The possibility of human infection with *D. caninum* should be emphasized in the teaching of medical students: the authors have reason to believe that other cases have been known in the United States, but have not been recorded.

H. J. O'D. Burke-Gaffney

HSIEH, Hsien-Chen. **Human Taeniasis in Taiwan with reference to Recent Epidemiological Studies in South Taiwan.** Reprinted from *Formosan Sci.* 1960, June, v. 14, No. 2, 44–54. [16 refs.]

The known agents of taeniasis in man in Taiwan are *Taenia saginata, T. solium* and *T. crassicollis*. The last 2 seem to be rare, though the author has found 3 cases of *T. solium* in the last few years, and a single case of *T. crassicollis* infection, which usually occurs only in cats and rats, was found in a child in Taipei in 1938.

T. saginata is commoner and the author has found this infection in 3 areas in South Taiwan since 1957. A list of findings in 13 surveys between 1915 and 1959 shows an incidence of 0·19% to 20·5%. This includes the author's findings between 1957 and 1959, in which an incidence of 0·49% to 8·84% was found among groups of 79 to 1,063 persons. He found the infection to be most prevalent among aborigines in hilly districts.

In a preliminary study of techniques, 32 proved cases of *T. saginata* infection were studied by (1) 4 direct smears, (2) finding of segments in the stools, (3) AMS III concentration technique and (4) adhesive tape perianal swabs. The results are tabulated and show that the percentages of positives were respectively 53·13%, 78·13%, 84·38% and 96·88%. He therefore used the adhesive tape method in an epidemiological study of *T. saginata* in San-Ming district, South Taiwan.

This district is some 600 metres above sea level and occupies an area of 15 sq. km. on the south-western slope of Mount Yi-Shan, along the upper reaches of the river Hsia-Tan-Shui. There are 3 isolated villages separated by rugged mountains. The annual rainfall is some 3,000 mm., principally from May to September, the average monthly temperature is 15°C. to 27°C. and the relative humidity more than 80%.

The people, members of the Bunun tribe, number some 1,359 and live under poor hygienic conditions in very low-built houses. They are agriculturists and engage in hunting wild animals. Pigs and goats are raised in the area but there are no cattle or water-buffaloes. The staple foods are sweet potato, *taro*, and occasionally rice. The people commonly eat the liver and other organs of animals raw and they sometimes eat undercooked meat.

The findings of the survey are shown in 7 further tables. The incidence among 1,063 people in the 3 villages varied from 6·87% to 10·29% with an overall average of 8·84%. There was a considerable variation with age; the lowest incidence for both sexes combined being 1·8% at years 0–4 and the highest 18·38% at 40–49, the highest individual incidence being in males at ages 40–49 (27·63%). The average for males was 10·99% and for females

6·65%, the excess incidence in males being accounted for largely by the high rates at ages 40–49. A statistical family study showed that there was no tendency to familial aggregation of the infection in the area.

Since cattle are absent in this district the intermediate host must be sought among the wild animals, such as deer, boars, rabbits and monkeys. The liver of deer is sometimes eaten raw as soon as the animal is killed and although cysticerci have not been found in such animals, it is suggested that they might be intermediate hosts of *T. saginata* in Taiwan. This hypothesis received some support from people in the districts who were shown preserved specimens and stated that they had seen such worms in deer and monkeys. However, the intermediate host can only be determined by future investigations.

H. J. O'D. Burke-Gaffney

MOLDENHAUER, W. & ZIEGLER, K. Klinische und röntgenologische Merkmale der Zystizerkose des Menschen. [**Clinical and Radiological Features of Cysticercosis in Man**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 4, 441–8. [Numerous refs.]

Cysticercosis from *Taenia solium* has become one of the rarest diseases in Germany. This paper reviews the diagnosis and gives an illustrative case of *Cysticercus cellulosae* infection.

HSIEH, Hsien-Chen. **Experimental Transmission of** *Cysticercus cellulosae* **in Taiwan Monkey,** *Macacus cyclopis* **(Swinhoe, 1862).** Reprinted from *Formosan Sci.* 1960, June, v. 14, No. 2, 66–80, 13 figs. on 2 pls. [26 refs.]

Eggs of *Taenia solium* were obtained from gravid segments of a worm passed by a woman after anthelmintic treatment and approximately 100,000 were fed to a Taiwan monkey (No. 1) *Macacus cyclopis.* A control monkey (No. 2) was given no eggs and was kept in the same cage. 22 weeks later No. 1 was killed and examined for cysts of *C. cellulosae.* They were found in subcutaneous tissues (5), brain (7), eyeball (1), muscles of thighs and legs (44), lymph gland (1), tongue (8), oesophagus (3), intestinal wall (3), lungs (10), heart (4), omentum (10), epiglottis (1). No cysticerci were found in the stomach, kidneys, spleen, uterus, gall bladder, bone-marrow and spinal cord. In monkey No. 2 (control) 3 cysticerci were found at post mortem, one in the abdominal wall and 2 in the thigh muscles. Cysts from monkey No. 1 were fed to monkeys (2), dogs (4), cat (1), rabbits (2), rat (1) and mice (6). In none of these animals, which were examined post mortem 2–10 weeks later, were any developing forms of *T. solium* found.

J. J. C. Buckley

HUTCHISON, W. F.; BRYAN, Mildred W. **Studies on the Hydatid Worm,** *Echinococcus granulosus.* **I. Species Identification of the Parasite found in Mississippi** [HUTCHISON & BRYAN]. *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 606–11, 2 figs. [21 refs.] **II. Prevalence in Mississippi** [HUTCHISON]. *Ibid.*, 612–15, 3 figs. [17 refs.]

I. In Mississippi, *Echinococcus* infections of man and dog are more common than elsewhere in the continental United States except for Alaska;

it is also common in native Mississippi swine, in which the cysts are small and sometimes atypical. The authors undertook to identify the species of *Echinococcus* in Mississippi as a preliminary step to epidemiological investigations.

Dogs, foxes (*Vulpes fulva*), raccoons (*Procyon lotor*), an opossum (*Didelphis virginiana*) and one domestic cat were fed fertile cysts from the liver of native hogs. Adult worms were obtained post mortem from the dogs, which readily became infected but the raccoon, opossum and cat were negative. Of the 2 foxes one was negative after 2 weeks and the other had only 9 worms, all immature and without eggs, after 12 weeks.

Hogs, deer-mice (*Peromyscus maniculatus*), white mice and white rats were fed with gravid proglottids of *Echinococcus*. None of the rodents became infected but all the hogs (3) contained numerous unilocular cysts in the liver when examined 5 months later.

The morphology of the adult worms recovered agreed with the description of *E. granulosus* and "The inability of the hydatid worm found in Mississippi to mature in the fox or the cat is in agreement with the findings for *E. granulosus* by previous investigators".

The authors conclude that in Mississippi the species concerned is *E. granulosus*.

II. "In Mississippi recorded autochthonous infections with *Echinococcus granulosus* have been found in seven humans and six dogs. . .

"The prevalence of infection with the larval stage of *E. granulosus* in 33,174 native Mississippi swine surveyed between April, 1957, and March, 1958, was 0·9%. In two areas where swine were found infected a small sample of red fox, raccoon, opossum and bobcat revealed no infections with the adult stage of the parasite." *J. J. C. Buckley*

AGOSIN, M. & ARAVENA, Luisa. **Studies on the Metabolism of** *Echinococcus granulosus*. **V. The Phosphopentose Isomerase of Hydatid Cyst Scolices.** *Enzymologia*. The Hague. 1960, Dec. 31, v. 22, No. 5, 281–94, 6 figs. [16 refs.]

MORELLINI, M. & FERRI, L. Ulteriori risultati nella diagnosi sierologica della idatidosi umana con l'antigene contenuto nell'estratto acquoso della membrana cistica. **[Further Results from the Serological Diagnosis of Human Hydatidosis with an Aqueous Extract of the Cyst Membrane as the Antigen]** *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 241–5. English summary (9 lines).

The authors obtained their antigen by water extraction of the outer cuticular membrane and the germinal layer of the *Echinococcus* cyst and they outline their technique of preparation in this paper.

They have performed the complement-fixation test with this reagent on specimens of blood serum from (1) 61 patients with hydatid disease, in whom the diagnosis was confirmed beyond any doubt, mostly through surgical removal of the cyst, and (2) 332 other persons, 42 of whom were well, 5 were pregnant and the remainder suffered from one or other of 14 classes of disease

other than echinococcosis. Of the former group, 56, or 91·8%, gave a positive reaction; 329 of the other 332, or 99·4%, were negative.

The hydatid cyst fluid provides the reagent for Casoni and the Ghedini-Weinberg tests, which were also applied to the 61 cases of confirmed echinococcosis in the above series: the Casoni test gave a positive result in 39, or 63·9%, and Ghedini-Weinberg was positive in only just over 30%. *J. Cauchi*

FISCHMAN, A. **A Rapid Latex Test for Hydatid Disease.** *New Zealand Med. J.* 1960, Oct., v. 59, No. 338, 485–7. [11 refs.]

In a previous paper [this *Bulletin,* 1960, v. 57, 728] the author described two new types of flocculation tests. In one of these tests polystyrene latex particles were coated with hydatid cyst fluid, and in the other a modified technique (with bentonite particles) was employed. A comparison of the latex test with the complement-fixation test (". . . essentially the Richardson-Wyler modification of the Wassermann technique") showed a total agreement of 98%, with an agreement of 93% in the positive sera. As a result of these observations the author concluded [the statement is from his present paper] that the "Latex Hydatid Test . . . is less time-consuming, technically simpler, and slightly more sensitive, than the Hydatid Complement Fixation Test".

In the present paper the author describes a rapid slide modification of the latex hydatid test. "In a surgically confirmed series of 51 cases the Latex Slide Test was positive in 47 (92%) as compared with 43 (84%) Complement Fixation Tests."

This paper, which should be consulted in the original by those interested, contains full details concerning the preparation and use of the various reagents required for the test. It also contains details concerning the medical histories of the patients whose sera were tested, as well as a brief survey of the relevant literature. *R. M. Gordon*

CHAUDHRY, M. U. **Hydatid Disease with special reference to Hydatid Cyst of the Liver and Five Case Reports.** *Pakistan J. of Health.* 1960, Oct., v. 10, No. 3, 182–91.

JUMINER, B. & ZAKINE, J. L'ankylostomose dans l'extrême-Nord du Cap Bon. [**Ankylostomiasis in the Extreme North of Cape Bon, Tunisia**] *Arch. Inst. Pasteur de Tunis.* 1960, Mar., v. 37, No. 1, 49–60. [17 refs.]

The inhabitants in the extreme north of Cape Bon, which is an agricultural area, are lightly infected with ankylostomiasis. The infection is believed to have been carried originally by Libyan and negroid Libyan immigrants from the valley of the Nile. The geographical and social conditions are such that might lead to perennial infection. People infected suffer a thirst. Control is chiefly by mass therapy with bephenium hydroxynaphthoate.

[See also this *Bulletin,* 1955, v. 52, 1211.] *W. E. Kershaw*

See also p. 621, MIRANDA & SALAS [**Clinical Studies on Patients with Chronic Malnutrition, Anaemia and Intestinal Parasites (Anaemic Nutritional Syndrome)**].

HURLY, M. G. D. **Win 5047 (Mantomide) in Hookworm Infections.** *Central African J. of Med.* 1960, Oct., v. 6, No. 10, 423–5.

The drug Mantomide (or Chlorbetamide) was introduced for the treatment of amoebiasis. SHETH *et al.* in India found it effective in hookworm infection [this *Bulletin*, 1957, v. 54, 186]. The present author tried it in hookworm (*Necator americanus*) infection in the Gambia to see if it was effective in a single dose treatment, using 2–4 gm. 6 out of 20 patients who reattended for follow-up were apparently cleared, a rate of 30%. No toxic manifestations were reported. The author concludes that these results compare unfavourably with those obtained with tetrachlorethylene.

[Tetrachlorethylene still appears to be the most effective single-dose treatment for *N. americanus*, but perhaps Mantomide like bephenium (Alcopar) presents advantages in being more effective yet non-toxic if given in 3- or 4-day courses.]

A. C. E. Cole

FAUST, E. C. & GIRALDO, L. E. **Parasitological Surveys in Cali, Departamento dell Valle, Colombia. VI. Strongyloidiasis in Barrio Siloé, Cali, Colombia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Nov., v. 54, No. 6, 556–63, 1 chart. [28 refs.]

"(1) In connexion with a continuing parasitological survey of a representative sampling of the population in ward Siloé, Cali, Colombia, conducted as part of an epidemiological study of this economically poor community, a special section of the programme has been concerned with *Strongyloides stercoralis* infection. This investigation included 92 families comprising 982 persons. Freshly-passed faecal specimens were examined macroscopically and microscopically for intestinal parasites, employing unstained and iodine-stained direct faecal films supplemented by zinc sulphate concentration preparations.

"(2) A total of 2,974 stools were examined from November, 1956, through April, 1959. One hundred and thirty-seven (14%) of the 982 individuals were found positive for *Strongyloides*. One hundred and six were first diagnosed from the first specimen submitted, 20 were first diagnosed from the second specimen, seven from the third sample, and four from the fourth. Subsequent samples provided no additional first positives.

"(3) The zinc sulphate centrifugal flotation technique proved to be 50% more efficient than the double cover-glass direct films in discovering *Strongyloides* larvae.

"(4) One or more persons in each of 62 of the 92 families were found to be infected, by the techniques employed. The number of positive persons per family varied from one to nine.

"(5) Appreciable infection (4·8%) occurred before 5 years of age, after which time the incidence rate rose rapidly during the next quinquennium, maintained this level for three decades, rose again in the fourth decade, remained high in the males and rapidly declined in the females. The incidence per cent. was consistently higher in the males than in the females after the first 5-year period.

"(6) Environmental conditions and low-grade personal hygiene are conducive to exposure to infective-stage *Strongyloides* on the moist dirt floors of the houses of the community. Autoinfection may play a significant role in maintaining the infection once it has become established.

"(7) There is no evidence that strongyloidiasis in ward Siloé is a severe debilitating disease; rather it appears to be a chronic parasitosis which is fairly well tolerated."

[This paper does not lend itself to further abstraction but should be read in the original by those interested.]

See also this *Bulletin*, 1959, v. 56, 1236; 1960, v. 57, 369.

MISRA, D. P. **Biliary Ascariasis.** *J. Indian Med. Ass.* 1961, Jan. 16, v. 36, No. 2, 49–51.

An account of 3 cases.

RODRIGUEZ, R. & ZULIAN, G. Osservazioni sulla sindrome meningea da ascaridiosi. [**Observations on the Meningeal Syndrome of Ascariasis**] *Giorn. di Malattie Infettive e Parassit.* 1960, Aug., v. 12, No. 8, 428–31. [27 refs.]

The authors review 114 cases of *Ascaris* infection seen in their hospital practice. The patients were mostly children, 54 being under 6 years old and 91 under 11. [One presumes that all these children came into hospital because they had signs and symptoms other than just the obvious presence of the worm.] 12 patients, more than 1 in 10, had manifestations of a meningeal involvement—headache, vomiting, cervical rigidity, positive Kernig and Brudzinski signs; 3 had photophobia and a similar number showed changes in the tendon reflexes on one or both sides. The cerebrospinal fluid had a raised cell content, mostly made up of leucocytes, but no other changes.

There were signs of involvement of the cerebrospinal system in 12 other patients, 8 having convulsions and 4 suffering from impairment of the sensory system: some degree of this dullness was noticeable in many of the meningeal and convulsive patients.

The authors discuss what might be the pathogenic mechanism of these conditions—allergic or toxic. They state that too heroic an administration of anthelmintics to a heavily infected patient may well bring on neurological manifestations. *J. Cauchi*

ADIAO, A. C., LIMJUCO, Josefina, NATIVIDAD, R. & DEL MUNDO, F. **Clinical Experience with Piperazine Hydrate (Upixon) in Ascariasis. (A Preliminary Report.)** *J. Philippine Med. Ass.* 1960, Aug., v. 36, No. 8, 583–7. [14 refs.]

The incidence of ascariasis in childhood in the Philippines, where a survey has shown that 67·3% of the children are infected, is one of the highest in the world. Ill health due to abdominal pain and loss of appetite are the usual symptoms, but 5 examples of more severe symptoms simulating an "acute abdomen" have been seen in the Children's Memorial Hospital during the past 2 years. The disease is largely confined to the poorer classes, and a survey of children admitted to paying beds in the hospital showed an incidence of only 11·7%.

The preparation (Upixon) whose efficiency was subjected to the clinical trial which is reported here was a flavoured 20% aqueous solution of piperazine hydrate, of which 5 ml. contain 1,000 mgm. of the salt. The dosage used was 0·5 ml. per kgm. body weight daily for infants, 1 teaspoonful (5 ml.) for children aged 1–2 years, 2 teaspoonsful for those aged 3–5 years and 3 teaspoonsful for those over 6 years, and adults. Two doses were given to each patient, the first after the evening meal, the second on the following morning after breakfast. Purgatives were given only to constipated patients. 100 children aged 1 to 12 years were treated.

Immediate effects were excellent, for worms began to be discharged even before the second dose was taken: the authors have not yet, however, calculated the clearance rates.

The drug was well tolerated and completely free from side or toxic effects. Its action on the worm is to block neuromuscular activity. *J. H. Walters*

ALVES, R. D. & VAN WYK, A. **A Brief Note on a New Focus of Filariasis in Southern Rhodesia.** *Central African J. of Med.* 1960, Oct., v. 6, No. 10, 431–2.

The authors visited an isolated village in the eastern Zambesi Valley, Southern Rhodesia, and noted that a few African adult males had enlargement of the scrotum. They therefore examined 26 persons who represented the total population of 4 kraals under a village sub-chief. Venous blood was taken between 10 p.m. and 2 a.m. and examined for microfilariae after suitable centrifugation. The 14 males were also examined physically. None showed elephantoid reaction in the lower extremities or thickening of the skin, but 6 had hydroceles or orchitis or both, which had existed for 2 to 20 years. Findings for these 6 are tabulated. In the blood films, 2 showed microfilariae of *Wuchereria bancrofti* only, 3 of *Dipetalonema perstans* only and one showed both types. The other 8 men showed no clinical lesions, but the blood films of 3 showed *W. bancrofti,* 6 *D. perstans* and 2 both types. Among the 12 females, 3 blood films were positive for *W. bancrofti,* 3 for *D. perstans* and 1 for both.

4,500 microfilariae of the *W. bancrofti* type were measured, 500 from each of the 9 patients. Detailed figures are given. The measurements corresponded to those of *W. bancrofti,* except that they were much smaller in mean length and width and it is suggested that they approximated to *W. bancrofti* var. *vauceli* [this *Bulletin*, 1956, v. 53, 630]. *H. J. O'D. Burke-Gaffney*

BROWNE, S. G. **Some Clinical Features of Bancroftian Filariasis among Adult Males in an Unreported Focus in the Belgian Congo.** *Central African J. of Med.* 1960, Dec., v. 6, No. 12, 513–16, 2 figs. [31 refs.]

This paper records an investigation into the pathological and economic aspects of a focus of *Wuchereria bancrofti* infection in the Oriental Province of the Congo. The villages affected are situated on the banks of the Congo, mainly on the south bank, to the east and west of the Lomami, a considerable tributary. The altitude is about 1,345 feet above sea level, within the rain

forest where the average daily temperature is from 70° to 90°F. with a relative humidity of nearly 100%.

The main factors concerned in the isolated situation of these infected villages are the presence, flight range and biting habits of the local vector in a stable climate: as a complication to this problem other filariid worms were present: both *Dipetalonema perstans* (65%) and *Loa loa* were present, while *D. streptocerca* was occasionally seen. Onchocerciasis was of very slight pathological importance.

Nocturnal blood (10.30 p.m. to midnight) examined by the three-drop method revealed a *W. bancrofti* microfilaraemia as follows: 63% in adult males; 67% in adult females; 4% in children (of each sex) under 16, and 9% in young people between 16 and 20. On two occasions *W. bancrofti* microfilariae were seen in midday blood in a series of 294 adult males. The incidence of microfilaraemia was lower in subjects with hydrocele than in the rest of the population—32% as against 74%.

Hydrocele was a much more important manifestation of *W. bancrofti* infection than elephantiasis. The deposits left after centrifugation of hydrocele fluid, withdrawn in the daytime by trocar and cannula from 53 hydroceles, contained microfilariae in 14.

In the Central African male Bantu the clinical evidence of involvement of the crural and inguinal lymph glands in *W. bancrofti* infections is obscured and complicated by recurrent, non-suppurative adenitis, due to a multiplicity of causes. In 27% of adult males the degree of enlargement was greater than that of uncomplicated post-inflammatory fibrosis. The pathology of the lymph-node involvement, especially when associated with funiculitis or hydrocele, may be explicable on allergic grounds.

Funiculitis of the spermatic cord was seen in many cases. In long-standing cases a simple or multilocular varicosity and dilatation of the lymphatics produced a condition resembling a true encysted hydrocele of the cord. In women the appearances simulated a hydrocele of the canal of Nück. Chronic or bilateral funiculitis was seen in 68% of adult males.

Of adult males with enlarged epitrochlear glands, 74% had evidence of *W. bancrofti* filariasis. Of those with no palpable glands, 54% had evidence of this, including 20% who had microfilaraemia.

Considered from the clinical and economic standpoints elephantiasis is not an important manifestation of *W. bancrofti* infection in Central Africa. There were 17 cases, of which the scrotum was involved in 10 patients and the legs in 6; in one woman the breast was also affected.

It was noted in those cases coming to operation that the tunica vaginalis and spermatic cord were not affected.

While it was impossible to exclude *W. bancrofti* as the causative factor in a few cases of gross elephantiasis seen it would appear that *Onchocerca volvulus* or *D. perstans* had greater claims. *Philip Manson-Bahr*

MOHAMED, A. F. M. **Filariasis of the Eye. 2 Case Reports.** *Bull. Ophthalm. Soc. Egypt.* 1959, v. 52, 425–8, 4 figs.

"The author describes 2 cases of filariasis of the eye, one in the lid and the other in the lacrimal sac region."

[The species was not identified.]

(L. 252) E

VARMA, B. K., GUPTA, B. K. & SINHA, V. P. **Observations on the Efficacy of a Five Day Course of Diethylcarbamazine in Microfilaria Positive Persons** (*W. bancrofti*). [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, May–July, v. 8, Nos. 3/4, 113–15.

Under the National Filaria Control Programme, India, a 5-day course of diethylcarbamazine is recommended for the mass treatment of filariasis. A pilot study was undertaken in the Filaria Control Unit, Patna West, to assess the efficiency of this treatment in 21 persons carrying the microfilariae of *Wuchereria bancrofti*.

Blood smears of 20 cmm. were taken between 8 p.m. and 10 p.m., and the 21 microfilaria carriers were then given diethylcarbamazine for 5 consecutive days, the daily dose for an adult over 18 years old being 200 mgm., with doses for younger persons graded according to age. [It is not stated whether this is a dose of a salt or of diethylcarbamazine base.] The tablets were swallowed in the presence of the drug distributors, and after the course of treatment blood films were taken again. Results are given in the text and in a table.

Microfilariae were cleared from the blood of 12 persons, were reduced in number in another 7 persons, and were unaffected in 2 persons. The average count was reduced from 49·2 microfilariae per 20 cmm. blood to 31·8. The authors consider that these results compare favourably with those obtained elsewhere in India under the same dosage schedule, for example by PATEL and PARANJPEY [this *Bulletin*, 1959, v. 56, 751] who however made observations on a larger number of people.

[The average microfilaria count before treatment is the average of 21 persons but that after treatment is the average of the 9 persons still positive; the overall reduction for the 21 persons is therefore considerably greater than is stated. Despite this, the results here recorded are scarcely satisfactory enough to explain why this 5-day course has been adopted as the routine treatment in filariasis control schemes.] *T. Wilson*

ROY, R. G., NAIR, C. P. & RAGHAVAN, N. G. S. **Effect of Different Microfilarial Levels in Vertebrate Host on Experimental Infection in Mosquitoes.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, May–July, v. 8, Nos. 3/4, 95–8.

The study here reported was carried out at the Filariasis Training Centre, Ernakulam, a branch of the Malaria Institute of India. *Culex fatigans* from a laboratory colony were fed at intervals during a 24-hour period on a carrier of periodic *Wuchereria bancrofti*. Microfilaria density was determined by a 20 cmm. blood film taken just before each batch of 100–150 mosquitoes was applied, and the mosquitoes were left to feed for one hour. Microfilaria counts are tabulated alongside the corresponding mosquito dissection results.

No mosquitoes took blood at 9 a.m. and 11 a.m. Out of 25 that fed at 5 p.m., one became infected and contained 3 infective stage larvae although microfilariae had not been found in the blood film. In general, there was a positive correlation between microfilaria density, percentage of mosquitoes infected, and average number of infective larvae per infected mosquito.

In discussion the authors explain that it was not possible to take blood films before and after the one-hour period of mosquito feeding, which would

have given a better estimate of microfilaria density. They mention the parallel between their findings and those of KRISHNASWAMI *et al.* in India [this *Bulletin*, 1961, v. 58, 103] and also the similar findings of YOUNG *et al.* in *P. falciparum* malaria, where mosquitoes became infected after feeding on patients whose blood films did not show gametocytes [*ibid.*, 1948, v. 45, 674]. *T. Wilson*

RAGHAVAN, N. G. S., NAIR, C. P. & ROY, R. G. **Experimental Infections of *C. fatigans* to Low Microfilarial Level.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, May–July, v. 8, Nos. 3/4, 99–103. [11 refs.]

These studies supplement those of ROY *et al.* [above] and were carried out at the Filariasis Training Centre, Ernakulam. *Culex fatigans* from a laboratory colony were fed, usually at night, on carriers of periodic *Wuchereria bancrofti* with peak counts of 10 microfilariae per 20 cmm. of blood. Microfilaria counts were estimated on the average of 3 films of 20 cmm. each, taken just before the mosquitoes fed; mosquitoes were dissected 13 days after feeding. The transmission potential suggested by KRISHNASWAMI *et al.* [this *Bulletin*, 1961, v. 58, 103] is used to compare the infectivity to mosquitoes of different microfilaria levels; it is obtained by multiplying the percentage of positive mosquitoes by the average number of infective larvae per positive mosquito.

The results are shown in a table and discussed in the text. Broadly speaking, there was a positive correlation between microfilaria count, percentage of mosquitoes infected, and average number of infective larvae per positive mosquito. 4 mosquitoes became infected out of 470 that had fed on persons whose peripheral blood did not show microfilariae; 1 cc. of venous blood from one person contained 2 microfilariae [recorded as "0·04 mf./20 cmm."; it is not clear whether the infected mosquitoes had in fact fed on this particular person]. There were variations in infectivity between carriers with identical microfilaria counts.

The authors compare their results with those of JORDAN in East Africa [*ibid.*, 1959, v. 56, 1264], and conclude that "there is no sub-infective level of microfilariae which can be considered non-infective to mosquitoes. However, with low microfilarial count the 'Transmission Potential' is very much lower when compared to what obtains with counts in the range of 11·50 mf./20 cmm. This fact has an important bearing on the utility or otherwise of mass administration of microfilaricides like Diethylcarbamazine for the control of *W. bancrofti* (periodic)".

["Transmission potential" as here defined takes no account of mosquito survival rate, which may have a considerable influence on potential infectivity, especially with higher microfilaria counts.] *T. Wilson*

LAGRAULET, J. Lésions oculaires, biopsies cutanées et localisation des nodules, chez les onchocerquiens du Venezuela. **[Ocular Lesions, Skin Biopsies and Localization of Nodules in Subjects with Onchocerciasis in Venezuela]** *Bull. Soc. Path. Exot.* 1960, July–Aug., v. 53, No. 4, 703–11, 4 graphs.

The author, a well known worker in this field, recently visited Venezuela and examined 635 persons in an endemic onchocercal zone and found 254 with onchocerciasis. He found that the ocular lesions were very abundant.

Most of these lesions were due to onchocerciasis. They were, in general, of little gravity. The most frequently observed lesions were corneal; there were fundus lesions but for the most part they were early; he did not encounter blindness due to onchocercal retinitis. He saw the type of choroidoretinal lesion described by RIDLEY which looks like accentuated tigroid fundus but the lesions were less advanced than those he had seen in Africa or in Mexico. Ocular lesions were most abundant when there were positive biopsies from the shoulder and the iliac crest. The biopsies were more likely to be positive in the scapular region than those from the iliac crest. No relationship existed between the presence of ocular lesions and the localization of the nodules. *D. P. Choyce*

HUANG, Wen-Hsien, CHIU, Jui-Kuang & KAO, Chih-Tien. [**The Incidence of Oxyuriasis among Schoolchildren in Urban and Rural Areas in Northern Taiwan**] *J. Formosan Med. Ass.* 1960, Aug. 28, v. 59, No. 8, 757–67. [23 refs.] [In Chinese.] English summary.

The authors, from the College of Medicine, National Taiwan University, carried out a survey for the presence of *Enterobius* among schoolchildren in Northern Taiwan in June–November 1959. This included 4,788 boys, aged 6–12, selected at random from 3 elementary schools in Taipei city; 1,949 pupils (1,262 boys and 687 girls) from 2 elementary schools and 143 pre-schoolchildren in a kindergarten in rural areas. Either a single examination or 3 examinations at 2–3 day intervals were made, by the adhesive tape method.

The results are set out in 7 tables in the Chinese text, but the following points of special interest are summarized below.

In the city schoolboys, the single examination revealed a mean of 64·8% positive. In the pupils from rural areas the mean was 58·5%.

When 3 examinations were made among 1,545 and 1,083 of these groups respectively, the incidence of positive findings increased from 73·9% to 88·0% and from 75·2% to 90·3%. Although multiple examinations increased the proportion of positive findings, it was observed that in most children who were negative at the first examination and positive thereafter, the infections were light.

Single examinations showed a higher incidence (65·1%) in girls than in boys (56·7%) but triple examinations showed no significant differences. The same applied to children of mainland parents, who had a higher incidence on single examination than had Taiwanese children, though no such differences were seen on triple examination. It is therefore assumed that girls have a relatively larger number of heavier infections than boys, and children from the mainland than Taiwanese children. *H. J. O'D. Burke-Gaffney*

HSIEH, Hsien-Chen, CHOW, Lien-Pin, YUAN, Jen-Chuan, SHIH, Cheng-Chun & KUO, Mu. **Epidemiological Studies on Enterobiasis among Aborigines in Mountainous Districts of South Taiwan.** Reprinted from *Formosan Sci.* 1960, June, v. 14, No. 2, 33–43, 1 map. [26 refs.]

"1. The infection of *Enterobius vermicularis* among aboriginal tribes in deep mountainous districts in South Taiwan is observed to be comparatively lower than among other people on this island.

"2. The incidence rate in both sexes is not significantly different.

"3. The infection is observed among all age-groups. In San-ming district, the lowest rate is found to be at the age-group 0–4 and highest rate is at the age-groups 10–14 and 50 or over. In Mao-lin district the incidence rate among all age-groups gives no significant difference.

"4. A tendency to familial aggregation of *Enterobius* infection is observed."

SCHNEIDER, J., BIGUET, J. & MACHEZ, J. M. Traitement de l'oxyurose par le diphétarsone-spiramycine et par le diphétarsone. [**Treatment of Enterobiasis with Diphetarsone-Spiramycin and with Diphetarsone alone**] Reprinted from *Thérapie*. 1960, v. 15, 648–54.

Diphetarsone-spiramycin (6753 RP) has been used for the treatment of intestinal amoebiasis [this *Bulletin*, 1958, v. 55, 405]. The authors noticed that the drug also caused the expulsion of threadworms. This was confirmed in a group of 19 adults and 24 children; oral treatment for 8 or 10 consecutive days with 2·5 gm. of 6753 RP for adults, correspondingly reduced for children, removed the worms from 30 of the 32 patients who could be followed for a period of 3–12 months. In the remaining 2 patients, threadworm eggs reappeared in 2–6 months. One of these was undoubtedly a reinfection from a relative and the other probably so.

A quantitative assessment was then made of the drug and its components in children aged 8–13 years at the Institut Médico-Psychologique at Armentières. All the children were heavily infected and, as is usual in such institutions, reinfection was certain and unavoidable. The effects of the drugs were therefore assessed by the absence of threadworm eggs during the first 2–4 weeks after treatment. Examination of the anal skin for threadworm eggs was made first thing in the morning, three times a week, by the Graham adhesive tape technique.

A group of 11 children all became negative after two 7-day courses of 1·5 gm. of 6753 RP. The interval between the courses was 1 week. Similar results were obtained when the dose was given to 8 children for 14 consecutive days. There were no side effects.

Spiramycin alone, at a dose of 0·75 gm. daily for 2 weeks, followed by 1·5 gm. daily for a further 2 weeks had no effect on the infection.

Diphetarsone alone, at a dose of 1·5 gm. daily for 2 weeks or in two courses of 7 days with an interval of 1 week, gave results which were almost identical with those obtained with the spiramycin salt. A dose of 0·5 gm. of diphetarsone (which is equivalent to the amount in 1·5 gm. of 6753 RP) in a further group of 17 children was less satisfactory, and it is concluded that the action of diphetarsone may be slightly reinforced by spiramycin.

The authors state their opinion that a dose of 1 gm. of diphetarsone alone, given daily for 1 week, should prove to be an effective treatment for threadworms. *L. G. Goodwin*

LEVY, L., MORRIS, R. & MCLEISH, G. **A Parasitic Infestation indistinguishable from Trichinosis—a New Disease?** *South African Med. J.* 1960, Dec. 17, v. 34, No. 51, 1069–72, 2 figs.

This paper gives a very detailed account of an infection occurring in a male South African (a medical student) who became ill with signs and symptoms

highly suggestive of trichinosis at the beginning of October 1959, but whose serum, when sent to a U.S.A. laboratory in January 1960, gave a negative bentonite flocculation reaction. The only reasons advanced by the authors that this may be a "new disease" appear to be based on the belief that trichinosis has not previously been reported from within the Union of South Africa, and that the patient's serum (after travelling from Africa to America) gave a negative flocculation reaction. *R. M. Gordon*

DEFICIENCY DISEASES

HAUCK, Hazel M., THORANGKUL, Dana & RAJATASILPIN, A. **Growth in Height and Weight of Elementary School Children (with some Observations on Health and Nutritional Status in Bang Chan, Thailand 1952–55).** *J. Trop. Pediatrics.* London. 1960, Dec., v. 6, No. 3, 84–91, 1 fig. [10 refs.]

"Children attending the Bang Chan primary school during the period of observation, November 1952 to November 1955, were weighed and measured at intervals of about 3 months. At least 5 consecutive observations, beginning in November of 1952, 1953 or 1954, were made on 110 boys and 197 girls, 7 to 14 years of age. Complete records for 3 years were obtained for 60 children.

"Height-age and weight-age tables are presented based on the observations made in November of each year. At successive ages, mean heights and weights increased more or less regularly. From 11 to 14 years of age the girls were, on the average, slightly taller than the boys. Both boys and girls in Bang Chan were somewhat less tall than urban Thai children of the same age.

"Seasonal variations were noted in weight gain, with greater mean weight gains from May to November, during the rainy season, than from November to May.

"Over half of the school children in attendance in November 1952, when the medical inspection was carried out, had possible signs of nutritional deficiency, but no clearly defined deficiency disease was found among them."

SWAMINATHAN, M. C., APTE, S. V. & SOMESWARA RAO, K. **Nutrition of the People of Ankola Taluk, N. Kanara.** *Indian J. Med. Res.* 1960, Nov., v. 48, No. 6, 762–74.

The authors report an investigation of diet and state of nutrition in a taluk in North Kanara, Mysore State, with an area of some 350 square miles and

a population of about 52,000. The taluk comprises a sparsely populated forest zone in the Western Ghats and a fertile coastal area supporting about 75% of the population. The investigation was in many respects similar to a larger study made a few years ago in the States of Andhra Pradesh, Madras, Mysore and Kerala in South India [this *Bulletin*, 1959, v. 56, 1177].

The staple food throughout the area is parboiled rice. Milk and milk products, eggs, meat and pulses are consumed in very small quantities. Fish is caught on the coast-line, but does not seem to be an important article in the diet of any of the major local communities. According to the results of diet surveys, the intake of animal protein of a group of fishing families was only 7 gm. per head per day, suggesting that the fishermen did not eat their own fish. In general the surveys revealed insufficiency of calories and protein and of various vitamins and minerals.

Clinical investigations showed the widespread existence of signs of malnutrition, the distribution of which varied in different segments of the population. Protein malnutrition was common among infants and young children. It was noted that "Although supplementary foods were usually started at the age of 6 months, breast feeding continued beyond 2 or even 3 years in a significant number of cases. Eighty per cent. of babies from all communities received some supplement or other before the end of the first year. . . . Cereal gruels, particularly rice water formed the main supplement in a majority. . . . The diets of these children were thus prone to be grossly inadequate especially during the early weaning period".

There was a high incidence of anaemia, particularly in women and children. Nearly 75% of pregnant women, 58% of lactating women and 63% of other women had haemoglobin values of less than 12·0 gm. %. Relatively few adult males showed evidence of anaemia. Malaria was not a contributory factor in the causation of anaemia; there was no history of attacks of malaria and spleen enlargement was not observed.

The authors concluded that the economic backwardness of the people was the main cause of the widespread malnutrition found in North Kanara. They advocate the development of cottage industries to supplement the low income of the population. The fishing industry suffers from lack of facilities for preserving and transporting fish. Since the study of dietary practices showed that the people knew little about the proper choice of foods and the feeding of children, education in nutrition might lead to dietary improvement.

W. R. Aykroyd

LOWENSTEIN, F. W. **Some Observations on the Nutritional Status of Medical Students in the Brazilian Amazon.** *Amer. J. Clin. Nutrition.* 1960, Nov.–Dec., v. 8, No. 6, 870–74. [11 refs.]

This study was part of a survey of nutritional status of population groups in the Amazon area which comprises 60% of Brazilian territory. The subjects were medical students at the University of Belem. There were 102 men and 31 women, all of European and predominantly of Portuguese origin.

Average dietary intakes, measured in each case for a 7-day period, were satisfactory with respect to calories, proteins, calcium, iron, vitamin A, C, thiamine, riboflavine, and niacin when compared with the recommended

allowances of the National Research Council, U.S.A. It was noteworthy that fat supplied only 20% of the total calories in the diet of the students. All were in good health and the incidence of signs of nutritional disease was low. Hypertrophy of the filiform papillae of the tongue was found in about 40% of all the students, circumcorneal congestion in 45% of the men and follicular hyperkeratosis in 26% of the women. These signs were not, however, thought to be caused by malnutrition. The incidence of caries was significantly higher than in North Americans. No reason for this could be found in the dietary data; for example, the average sugar intake of the Brazilian students was somewhat below average intake in North America. *R. Schwartz*

GOPALAN, C., VENKATACHALAM, P. S. & BHAVANI, B. **Studies of Vitamin A Deficiency in Children.** *Amer. J. Clin. Nutrition.* 1960, Nov.–Dec., v. 8, No. 6, 833–40. [18 refs.]

24 to 30% of the children with clinical malnutrition attending clinics in Coonoor and Hyderabad show signs of vitamin A deficiency. The condition was studied in 319 patients during 5 years in Coonoor and 49 in 8 months in Hyderabad. In both areas the deficiency occurred most frequently in the age-group of 3–5 years and was present in 32–36% of all cases of kwashiorkor. Corneal involvement was found in only 7·2% of the Coonoor children, but occurred in 66% of the Hyderabad children who generally showed more severe vitamin A deficiency. In neither group was it possible to correlate night-blindness with corneal changes.

A dietary survey and some biochemical investigations were carried out on the two groups, on a group of children suffering from kwashiorkor without vitamin A deficiency, and control groups of healthy children from the same socio-economic level as the patients. The dietary intakes of carotene and vitamin A were equally low in Coonoor and Hyderabad (250–300 IU carotene, 100–150 IU vitamin A) and bore no evident relation to the development of signs. The consistently greater severity observed in Hyderabad was thought to be due to the habit of not weaning babies for a year, whereas in Coonoor breast supplementary feeding was begun at 6 months. Preliminary investigations indicate that the vitamin A content of breast milk in poor mothers in Hyderabad is considerably lower than that of women in Coonoor. There was some indication that the more severe cases were frequently the result of impaired intestinal absorption caused by protein deficiency or intestinal infections; the incidence of vitamin A deficiency could not, however, be correlated with seasonal outbreaks of such infections.

Serum carotene and vitamin A levels were low even in the control groups and in the group with kwashiorkor alone when compared with those found in normal children in the United States. They were lowest, however, in the children with signs of vitamin A deficiency. All levels rose rapidly on administration of vitamin A. In the children with kwashiorkor, serum levels were raised on treatment with protein alone. This was thought to be due to release of vitamin A from the liver, a process that is impaired in protein malnutrition. The destruction of vitamin A by lysed red blood corpuscles was increased in the cases of vitamin A deficiency with or without kwashiorkor, but returned to normal on treatment with the vitamin. *R. Schwartz*

MIRANDA G., M. & SALAS C., J. Estudios clinicos sobre pacientes con desnutrición crónica, anemia y parasitosis intestinal (sindrome anémico nutricional). **[Clinical Studies on Patients with Chronic Malnutrition, Anaemia and Intestinal Parasites (Anaemic Nutritional Syndrome)]** *Acta Méd. Costarricense*. 1960, May–Aug., v. 3, No. 2, 125–51. [30 refs.] English summary.

Between March 1958 and October 1959 the authors made a special study of 110 patients in the San Juan de Dios Hospital in Costa Rica; two-thirds were aged 10 to 39 years. The basis of selection was clinical anaemia for which no cause was apparent initially other than hookworm disease. A wide range of clinical and laboratory examinations were made and the results are set out in 17 tables. More than two-thirds of the patients came from the province of San José. The principal clinical features were asthenia, anorexia, dyspnoea, dizziness, headache, abdominal pain and diarrhoea, and these were reflected in the findings. Nearly half of the patients had apical systolic murmurs, 24% had slight liver enlargement, 16% oedema of the lower limbs, and 11% splenomegaly, and associated diseases were present in about one-third.

All had hookworm ova in the faeces and 90% had *Trichuris*. Other parasites were common, including *Entamoeba histolytica* (13%). The patients were very poorly nourished and in 58 examined the daily calorie intake was only 750 to 1,500 calories. Protein intake (mostly vegetable) was 21 to 50 gm. and fats 6 to 18% of the calorie intake. On the other hand, only 6 patients had an iron intake of less than 11 mgm. daily and frank avitaminosis was not common. Serum protein was low, sometimes less than 3 gm.% and this was accounted for largely by low albumin levels. Liver biopsies showed no evidence of fibrosis or necrosis.

Haemoglobin was between 2·6 and 7·5 gm.% initially, and in 99 patients given iron, this caused an increase of haemoglobin of 3 to 8 gm. in 61 patients and of 2 gm. or less in 25. Tetrachlorethylene in a total dose of 9 gm. spread over 3 days was effective in 58·4% of 89 patients: in 28 given a second course of treatment it was effective in 17.

The authors give reasons for concluding that this condition is different from ordinary hookworm anaemia and from kwashiorkor. Malnutrition is a fundamental element, and they suggest that the condition should be called " Anaemic Nutritional Syndrome ". *H. J. O'D. Burke-Gaffney*

JELLIFFE, D. B., SYMONDS, B. E. R. & JELLIFFE, E. F. P. **The Pattern of Malnutrition in Early Childhood in Southern Trinidad.** *J. Pediatrics*. St. Louis. 1960, Dec., v. 57, No. 6, 922–35, 4 figs. [26 refs.]

Prosperity has increased in Trinidad; over the last 10 years the national income per person has risen by 53·6%. Education is spreading, and public health has improved. Since 1901 life expectancy at birth has increased by 60%, and the infant mortality rate has been reduced by two-thirds. Milk preparations, including inexpensive dried skimmed milk, are readily available. Despite these improvements, protein-calorie malnutrition is an important cause of admission to hospital and of death [this *Bulletin*, 1959, v. 56, 202].

The paper reports results of a hospital investigation, and a random sample

field survey in the main town of southern Trinidad—San Fernando (population 37,000), and the surrounding County of Victoria (population 124,000). An analysis of admissions to the general hospital from 1956 to 1958 shows an increasing proportion (13·4%–22·8%) of cases of gastroenteritis, mostly in those under 2 years of age, of an increasing annual number of total admissions of children under 10 years of age (1,544–2,275). In 1958 there were 70 admissions with a primary diagnosis of malnutrition; of these only 10 were aged between 1–3 years, 60 were aged 1–12 months, of whom 27 were aged 2–4 months. Kwashiorkor was diagnosed in 18, of whom 15 were under 1 year; 7 of these 15 infants died, all but one aged 2–4 months. The remaining 52 children all had some form of protein-calorie malnutrition, principally marasmus. Severe diarrhoea was often the precipitating factor in marasmus.

In the 15 infants with kwashiorkor there had been no breast feeding in 3, intermittent breast feeding (2 or 3 times daily) in 3, and in 8 lactation had stopped at least 2 months before the onset of illness. Dietary histories were obtained of 60 patients with malnutrition and of these 19 had never been breast-fed.

493 children aged under 2 years were admitted in 1958 with a primary diagnosis of severe diarrhoea. 83 (69%) of these occurred at 0–6 months, and of these feeding histories obtained in 69 showed that 25 had never been breast-fed; in 27 breast feeding had stopped at least 2 weeks before onset of diarrhoea; in 12 breast feeding was partial. The artificial feeds were carbohydrate paps, sometimes with very small quantities of overdiluted preparations of milk and may be termed bacteriologically dangerous and nutritionally unbalanced.

The field survey was conducted in 15 randomly selected villages and 2 slum areas in the town, when the whole child population aged 0–4 years was examined. The system of clinical examination was that recently used in Haiti [JELLIFFE and JELLIFFE, this *Bulletin*, 1961, v. 58, 244]. The survey showed a low incidence of protein-calorie malnutrition in the community, with only 2 cases of kwashiorkor, and an oedema index of 1% for infants.

The lower age incidence of kwashiorkor, as compared with that in other Caribbean countries, may be related to increasing industrialization and sophistication. The spectacular decline in breast feeding that has occurred in the temperate zone shows signs of starting in tropical countries with the introduction of urbanization and technological sophistication; the trend has already been reported both in India and Africa. In the absence of effective health education, the twin problems of infantile kwashiorkor and infective diarrhoea may be expected to increase in these societies, proportionately with a decrease in breast feeding. *T. P. Eddy*

BAKER, R. W. R. & MACDONALD, I. **Liver and Depot Fatty Acids in Kwashiorkor.** [Correspondence.] *Nature*. 1961, Feb. 4, v. 189, 406–7.

One of the features of kwashiorkor is the association of increased liver fat with normal amounts of depot fat. In a previous investigation it was demonstrated that the phospholipid, non-saponifiable and fatty acid fractions of the liver lipid in kwashiorkor differed in their proportions and their degree of non-saturation from those seen in other diseases [MACDONALD, this *Bulletin*,

1961, v. 58, 358]. To find out whether these differences extended to the fatty acid composition, lipid from post-mortem portions of liver of children aged 1 to 4 years was extracted and the acids obtained by hydrolysis were examined by gas chromatography. The main result was that in kwashiorkor the proportions of the liver fatty acids resemble those found in the depots, whereas they differ in normal controls. *H. Lehmann*

CLEGG, K. M. & DEAN, R. F. A. **Balance Studies on Peanut Biscuit in the Treatment of Kwashiorkor.** *Amer. J. Clin. Nutrition.* 1960, Nov.–Dec., v. 8, No. 6, 885–95. [16 refs.]

A biscuit made mainly of peanuts and maize meal with only a small supplement of dried skimmed milk had been used for some time to replace a milk mixture in the treatment of kwashiorkor at the Infantile Malnutrition Unit in Kampala. The present investigation was made to determine the most effective composition of such a biscuit, and to compare it as accurately as possible with a milk mixture in the feeding of young children.

Nitrogen balance studies were carried out on children who had been successfully treated for kwashiorkor with a milk protein mixture for at least 15 days. All were boys between the ages of 18 to 36 months and weighing from 5·5–9·5 kgm. Their clinical recovery from acute protein malnutrition was confirmed by biochemical measurements. Each child was submitted to two successive balance periods of 4 days, one on the standard milk diet, and the second on the biscuit feed.

Six different biscuits were tried. The mixture that was found most successful consisted of 41% crushed peanuts, 20% maize meal, 6% wheat flour, 12% cane sugar, and 6% cotton-seed oil. The ingredients were mixed with water and lightly baked into biscuits which could be stored and crushed into a powder for use in feeds. Liquid feeds were made up to contain 15 gm. of dried skimmed milk for each 100 gm. of biscuit. This was found to be the most effective level for the addition of milk. It is interesting that when the same amount of milk was added to the biscuit dough and baked in it, much of its supplementary value was lost.

Within the range of individual variation, nitrogen retentions and weight gains were the same with the biscuit mixtures and the milk feeds, although there were considerable differences in the amino-acid compositions of the two diets. The authors commented on this fact and suggested that a re-assessment of amino-acid requirements in children was indicated. They also discussed their choice of the protein: total-calorie ratio which was about 15% in both mixtures. Protein intakes were as high as 3–5 gm. per kgm. of body weight per day with retentions of 20–30%. Fat supplied about 40% of the total calories and was well absorbed from both types of feeds.

[See also this *Bulletin,* 1960, v. 57, 1098.] *R. Schwartz*

SPRUE

ANDERSON, Barbara, BELCHER, E. H., CHANARIN, I. & MOLLIN, D. L. **The Urinary and Faecal Excretion of Radioactivity after Oral Doses of ^{3}H-Folic Acid.** *Brit. J. Haematol.* Oxford. 1960, Oct., v. 6, No. 4, 439–55, 8 figs. [23 refs.]

In man the faecal excretion of folic acid exceeds the daily intake because there is considerable bacterial synthesis of this compound in the intestines. However, when folic acid is labelled with tritium (^{3}H) balanced studies of folic acid can be made. The present paper describes such an investigation and also reports on the failure of large injections of ordinary folic acid to affect the urinary excretion of radioactivity after oral doses of ^{3}H folic acid. Chromatographic analysis of the urine demonstrated that the greater proportion of the radioactivity in the urine was in fact folic acid or chemically related to folic acid.

The subjects studied included 11 patients with idiopathic steatorrhoea, 1 case of tropical sprue before and after treatment, and one other after treatment, 1 of entero-entero anastomoses, 4 with pernicious anaemia, 1 with megaloblastic anaemia following gastrectomy, 2 with nutritional megaloblastic anaemia and 2 with refractory sideroblastic anaemia. Normal control subjects and patients with megaloblastic anaemia, not associated with faulty absorption from the intestines, excreted usually less than 25% and never more than 35% of orally administered radioactivity in their faeces. Most patients with idiopathic steatorrhoea excreted more than 50% but in a few the amount excreted was within the upper limit of the normal range. The urinary excretion of radioactivity was enhanced both in control subjects and in patients when non-radioactive folic acid was given intravenously 30 minutes before the oral dose. This indicates that the injected folic acid did not interfere with the absorption of folic acid from the intestine. *H. Lehmann*

HAEMATOLOGY

SHARMA. R. S., DAGLI, P. M., PAREKH, J. G. & PATEL, B. D. **Haematological and Plasma-Protein Studies in Healthy Indian Children.** *Indian J. Med. Sci.* 1960, Nov., v. 14, No. 11, 954–9, 1 fig.

For 172 healthy children in Bombay, aged 4 to 12 years, the following mean values were found: Hb 13·4 gm./100 ml., mean corpuscular Hb concentration 31·7% serum protein 7·8 gm./100 ml. (albumin 5·8, globulin 2·0). The normal minor variations with age were present. 41 of the children were Jewish, on a mixed diet, and 131 were vegetarian Hindus; but there was no detectable difference in the above respects. The group as a whole did not differ from similar groups in the United States, Canada, or Britain for which references

are given. At this age in childhood, therefore, there was no sign of a racial or climatic anaemia in the well-nourished. *Alan B. Raper*

METZ, J., RANDALL, T. W. & KNIEP, C. H. **Addisonian Pernicious Anaemia in Young Bantu Females.** *Brit. Med. J.* 1961, Jan. 21, 178–9, 1 fig. [11 refs.]

"Three young Bantu women were found to be suffering from a condition indistinguishable from true Addisonian pernicious anaemia.

"The significance of this finding is discussed with reference to the megaloblastic anaemias found in malnourished populations."

STUART, K. L. & MACIVER, J. E. **Pernicious Anaemia in Jamaica.** *Brit. Med. J.* 1961, Jan. 28, 236–9. [27 refs.]

Diseases are often found when they are looked for. In a 30-month period, while they were studying megaloblastic anaemias, the authors found 10 adult negroid West Indians with pernicious anaemia, the diagnosis being confirmed in every case by the usual clinical and laboratory findings, together with characteristic results when the Schilling test was performed with and without added intrinsic factor, and by finding gastric atrophy in the 6 patients so examined. 7 patients had peripheral neuropathy, and 5 of these had a cord lesion as well. All responded to vitamin B12.

The only difference between the disease in these patients and in Caucasians was that in the former anorexia and weight loss were prominent. This is thought to be because their consumption of high-class food was marginal, and evidence is adduced that similar partial deprivation even in Caucasians will encourage the onset of pernicious anaemia in those predisposed to it.

Compared with whites, Negroes are said to suffer less from pernicious anaemia in the United States, and much less in Africa. Access to full investigation may be a factor in the former case, and this plus the heavy mortality before the pernicious anaemia age may be important in Africa. Consequently, the authors think the rarity of this disease in the Negro has been overemphasized. *Alan B. Raper*

EDOZIEN, J. C., ADENIYI-JONES, C. & WATSON-WILLIAMS, E. J. **Serum Proteins and Hepatic Function in Pregnancy with Anaemia in Nigerian Women.** *Brit. Med. J.* 1961, Feb. 4, 333–6. [26 refs.]

Observations were made on the serum proteins and liver function of pregnant Nigerian women with and without anaemia and on a control series of non-pregnant healthy Nigerian women volunteers in order to test the view put forward by WOODRUFF [this *Bulletin*, 1952, v. 49, 301 and *Brit. Med. J.*, 1956, v. 1, 682] that the anaemia of pregnancy in West Africa is the result of protein malnutrition and of nutritional liver damage.

No significant differences in total protein concentration and in the serum protein fractions were found between pregnant Nigerian women without

anaemia and the majority of the anaemic pregnant women. 6·6% of the anaemic pregnant women had evidence of protein deficiency but even in these satisfactory response to treatment with iron or folic acid or both indicated that the anaemia was not due to the protein deficiency.

No significant differences were found between the results of liver function tests in normal pregnant women and pregnant women with anaemia except that 10% of the anaemic women had abnormal seroflocculation reactions, which were considered to be secondary to the anaemia rather than indicative of primary liver disease.

The data indicated that dietary deficiencies of haemopoietic factors, particularly folic acid, were important in producing the anaemias of pregnancy of Nigerian women, but that protein deficiency and hepatic damage had little aetiological significance. The results are detailed in 6 tables.

W. P. Stamm

VINKE, B., VAN DER SAR, A., FABER, J. G. & DE VRIES, J. A. **Penicillin in Nutritional Megaloblastic Anaemia in Curaçao.** *Trop. & Geograph. Med.* Amsterdam. 1960, Mar., v. 12, No. 1, 26–30.

Published work indicating that the action of antibiotics in nutritional and megaloblastic anaemia is mediated through the absorption of folic acid rather than through mechanisms involving vitamin B12 is first reviewed. It is then stated that this is particularly likely to be so as published work also indicates that at least one patient in whom penicillin induced a haematological response in megaloblastic anaemia had been eating meat daily and was, therefore, unlikely to have suffered from vitamin B12 deficiency but might have been deficient in folic acid.

The authors treated, with penicillin, 8 patients who had nutritional megaloblastic anaemia and 2 who had megaloblastic anaemia in pregnancy, and in 9 vitamin B12 levels in the serum were estimated before and after administration of the penicillin. After treatment with penicillin the haematological responses to orally and parenterally administered vitamin B12 and to orally administered folic acid were assessed.

No definite conclusions could be drawn from the findings but it was thought justifiable to state that none of their patients who had a pathologically low vitamin B12 serum level responded to penicillin [see also this *Bulletin,* 1956, v. 53, 98]. The only patient who had a non-pathological but nevertheless lowered vitamin B12 serum level responded suboptimally to administration of penicillin orally. One of the 4 patients who had normal vitamin B12 levels responded well to penicillin whereas 2 others exhibited a suboptimal response. Vicillin K, administered orally, was as effective as similar doses of penicillin G administered parenterally but single oral doses of penicillin G appeared to be more effective than similar doses of Vicillin K.

It is stated that penicillin in these cases may have acted by providing the body with more available folic acid or its derivatives. [In this connexion the authors probably had in mind already published work which they quote and which indicates that at least one other antibiotic, *i.e.* aureomycin, counteracts the effect of the folic acid antagonist aminopterin.]

A. W. Woodruff

VINKE, B., VAN DER SAR, A., FABER, J. G. & DE VRIES, J. A. **Serum Vitamin B_{12} Levels and Response to Treatment of Megaloblastic Anaemia in Curaçao.** *Trop. & Geograph. Med.* Amsterdam. 1960, Mar., v. 12, No. 1, 31–7, 3 graphs.

12 patients with nutritional megaloblastic anaemia and one with megaloblastic anaemia in pregnancy were studied and the serum vitamin B12 levels were estimated. [Sprue was excluded as a diagnosis in these cases by the finding of normal fat digestion or normal vitamin A tolerance. Several authors have described such cases as sprue in this part of the world, sometimes even without assessing fat absorption.] The patients were divided into three groups according to whether their serum vitamin B12 levels were very low, low but only possibly pathologically low, or normal. All patients with very low serum vitamin B12 levels reacted to oral or to intramuscular vitamin B12 as also did those with the less marked lowering of the serum vitamin B12. Those with normal serum vitamin B12 levels did not respond haematologically to administration of the vitamin but they did respond well to folic acid. The patient with megaloblastic anaemia in pregnancy responded to intramuscularly administered vitamin B12 but not to folic acid.

It is deduced that there are two types of nutritional megaloblastic anaemia in Curaçao: in one there is and in the other there is not vitamin B12 deficiency. These may be differentiated by their response to administration of vitamin B12 or folic acid or both, but some patients with normal serum vitamin B12 levels may, nevertheless, respond haematologically to administration of vitamin B12 as was evidenced by the authors' case of megaloblastic anaemia in pregnancy. It is difficult to decide whether the patients with megaloblastic anaemia and low serum vitamin B12 levels are suffering from pure vitamin B12 deficiency or from such deficiency plus folic acid deficiency. This, however, can be decided by observing the haematological response to folic acid after the administration of vitamin B12. Some of the patients studied also had a low MCHC and in view of this it is deduced that iron deficiency may sometimes prevent a haematological response to folic acid. *A. W. Woodruff*

HELLER, P., WEINSTEIN, H. G., WEST, M. & ZIMMERMAN, H. J. **Enzymes in Anemia: a Study of Abnormalities of Several Enzymes of Carbohydrate Metabolism in the Plasma and Erythrocytes in Patients with Anemia, with Preliminary Observations of Bone Marrow Enzymes.** *Ann. Intern. Med.* 1960, Nov., v. 53, No. 5, 898–913, 9 figs. [23 refs.]

A number of enzymes involved in carbohydrate metabolism were investigated in anaemic patients' plasma, red cells and bone marrow. The following were determined: phosphohexoisomerase (PHI), aldolase (Ald.) and lactic dehydrogenase (LD), which are representative enzymes of the anaerobic glycolytic cycle; malic dehydrogenase (MD) and isocitric dehydrogenase (ICD) of the citric acid cycle; glucose-6-phosphate dehydrogenase (G-6-PD) and 6-phosphogluconic dehydrogenase (6-PGD) of the hexosemonophosphate shunt.

In megaloblastic anaemia LD and MD were found to be increased in the plasma and there was also some increase in 6-PGD, Ald., PHI, and ICD. In the red cells some of the enzyme values were also slightly increased and in

the bone marrow they were much higher than those obtained from normal marrow. The difference applied to marrow cells as well as to the marrow plasma. In haemoglobinopathies a considerable rise in MD and LD was found in the plasma. In sickle-cell anaemia, sickle-cell haemoglobin C disease and haemoglobin C disease an increase was always found in enzyme levels of the erythrocytes. This applied particularly to LD and G-6-PD and 6-PGD. In thalassaemia minor the plasma values were, with one exception, within normal limits and the intra-erythrocytic content of all enzymes, except for the Ald. and ICD, was abnormally high when expressed per gm. of haemoglobin. But this is to be interpreted in conjunction with the abnormally low haemoglobin content, and when the enzyme content was calculated per number of erythrocytes the figure was less abnormally high. The authors consider that their hypothesis that the high plasma levels of LD and of the other enzymes originate in the bone marrow appears to be supported by their studies of megaloblastic bone marrows. *H. Lehmann*

FRÉZAL, J. Le favisme et l'anémie par sensibilité à la primaquine. [**Favism and the Anaemia due to Primaquine Sensitivity**] *Maroc Méd.* 1960, Nov., v. 39, No. 426, 1218–24. [15 refs.]

This article gives an excellent and comprehensive review of the syndrome based on glucose-6-phosphate dehydrogenase deficiency. This deficiency which gives rise to drug sensitivity and favism is an inherited abnormality associated with the X chromosome. It can therefore occur in females as a heterozygous or homozygous condition and in hemizygotic males. This deficiency is also the basis of Heinz bodies formation after treatment of blood with phenylhydrazine. There is a racial difference in incidence and the condition is found particularly in Mediterranean populations. It is interesting that among the Jews it is absent in the Central European group, the Ashkenazis, but a considerable incidence is found in those from the Southern European and the oriental groups (Sephardis).

In addition to presenting this up-to-date survey in the French language the author reports a case of favism in a 4-year-old child of Italian origin.

H. Lehmann

JENSEN, W. N., RUCKNAGEL, D. L. & TAYLOR, W. J. *In vivo* **Study of the Sickle Cell Phenomenon.** *J. Lab. & Clin. Med.* 1960, Dec., v. 56, No. 6, 854–65, 4 figs. [32 refs.]

Venous catheterization and arterial punctures were performed in 10 patients with sickle-cell anaemia and 2 with sickle-cell Hb-C disease. With the necessary precautions, oxygen saturation and the percentage of sickled cells were determined in samples from the jugular, hepatic, and renal veins, inferior vena cava, right atrium, pulmonary artery, right ventricle, and coronary sinus. In a given patient, the percentage of sickled cells was fairly constant from one venous site to another, despite moderate differences in oxygen content, and was always greater than in the femoral arterial blood. There were variations between patients, from figures of about 10% to 30%, but these could

not be correlated with age, the severity of the anaemia, or the amount of foetal haemoglobin present; nor was there any negative correlation between venous sickling and the reticulocyte count. It appears from the authors' Table II that when venous sickling was most prominent the percentage of irreversibly sickled cells was highest.

In 3 patients, intravenous sodium bicarbonate (2·5 mEq./kgm.) led to no alteration in the proportion of sickled cells, though it caused nausea and mild transient tetany.

While the degree of sickling induced *in vitro* bears a fairly simple relation to the oxygen tension used, no relation between the two factors was found in these *in vivo* studies. Many possible reasons for this are discussed, concluding with the statement: "Finally, it must be realized that the most important anatomic site at which sickling may occur is in the capillaries. It seems possible that sickling may occur in a portion of a capillary bed and not be reflected by sampling of blood at the venous level of circulation".

[Certainly the question turns upon what proportion of the cells reside in relatively anoxic capillary beds, and for how long; and upon the age, and the capacity to "un-sickle", of these cells.]

[See also this *Bulletin,* 1958, v. 55, 935.] *Alan B. Raper*

RAHIMTOOLA, S., GOOD, C. J. & DAVIES, P. D. B. **Pulmonary Infarction in Disorders associated with the Sickle Cell Trait.** *Thorax.* 1960, Dec., v. 15, No. 4, 320–24, 3 figs. [17 refs.]

3 adult male West Indians living in London each suffered from a febrile illness with physical and radiological signs in the chest, which, at some stage in each case, could have been ascribed to pulmonary infarction. This possibility might, in the authors' view, be connected with the fact that each patient showed sickling (1 was of SC, and 2 of AS type). They admit that the findings did not prove that the illnesses from which the patients suffered were a consequence of intravascular sickling, and that pulmonary infarction and pneumonitis can be difficult to distinguish. [The abstracter agrees.]

Alan B. Raper

SILVESTRONI, E. & BIANCO, I. Dati statistici sulla frequenza della microcitemia e del morbo di Cooley nella Sardegna meridionale. [**Statistical Data on the frequency of Microcythaemia and of Cooley's Anaemia in Southern Sardinia**] *Nuovi Ann. d'Igiene e Microbiol.* 1960, Sept.–Oct., v. 11, No. 5, 339–48, 1 fig. [21 refs.]

The authors carried out a survey in the summer of 1960 in the province of Cagliari, which covers about the southern third of the island of Sardinia. They examined 3,833 children and other young persons of each sex in 40 institutions and holiday camps: they found microcythaemia in 914 subjects and they claim that this rate of 23·84% is the highest recorded in any region of Italy.

They investigated the incidence of microcythaemic anaemia in the indigenous population and traced 503 actual cases of Cooley's anaemia and 105 other

households where children had died of this disease. They personally examined 91 of the patients: the family of some of these had lost one or more members from Cooley's anaemia, adding up to a total of 68 deaths. There was a history of 79 more children who had succumbed to the disease in 42 other families.

J. Cauchi

PEARSON, H. A., MCFARLAND, W. & KING, E. R., with the technical assistance of W. BECKNER & C. PETROFF. **Erythrokinetic Studies in Thalassemia Trait.** *J. Lab. & Clin. Med.* 1960, Dec., v. 56, No. 6, 866–73, 3 figs. [21 refs.]

[See also this *Bulletin*, 1957, v. 54, 606.]

KENT, G. & POPPER, H. **Secondary Hemochromatosis: its Association with Anemia.** *Arch. Pathology.* 1960, Nov., v. 70, No. 5, 623–39, 10 figs. [32 refs.]

There is an increasing frequency of haemochromatosis in patients with chronic anaemia from many causes. The reason for this is believed to be that repeated blood transfusions introduce large stores of iron. The pathogenesis of this secondary, or endogenous haemochromatosis or transfusion siderosis is not fully understood. The present paper reports an effort to throw some light on the disease by comparing the liver changes in secondary haemochromatosis with those seen in early and fully developed primary haemochromatosis which is considered an inborn error of iron metabolism.

The study is based on post-mortem material seen in Chicago. There were 5 patients with primary haemochromatosis, 2 in the early and 3 in the later stages of the disease. None of them had been anaemic. There were 8 cases of subacute haemolytic anaemia and the remainder fell into two groups, one composed of 3 cases of Cooley's anaemia, 6 of Di Guglielmo's disease, 16 of refractory anaemia, 20 of pernicious anaemia and 12 of sickle-cell anaemia. These were compared with a group of anaemias associated with pancytopenia (8), lymphoma (25), chronic leukaemia (45) and hepatic cirrhosis with excess iron (20).

The changes in the liver resembled in secondary haemochromatosis those seen in the early stages of idiopathic haemochromatosis. The morphological features suggested that excessive iron deposition was the cause of cellular damage in the liver and that this parenchymal damage was in turn followed by fibrosis. In the anaemias three types of iron deposition could be differentiated. In the group comprising Di Guglielmo's anaemia, Cooley's anaemia, sickle-cell anaemia, and pernicious anaemia the iron was found predominantly in the liver cells, and in anaemias caused by haemolysis alone in the reticulo-endothelial cells. In the leukaemias and in some cases of cirrhosis both types of cells were affected, with a predilection for the reticulo-endothelial system. The authors divide therefore haemosiderosis into parenchymal and reticulo-endothelial siderosis. If the parenchymal siderosis becomes associated with tissue damage it is then designated as haemochromatosis. It follows that blood transfusions cannot be a primary cause of secondary haemochromatosis and

are merely exacerbating the damage caused by the anaemia associated with excessive absorption and release of body stores of iron with concomitant faulty utilization by the bone marrow. *H. Lehmann*

VENOMS AND ANTIVENENES

CHANG, Chuan-Chiung. **Studies on the Mechanism of Curare-Like Action of *Bungarus multicinctus* Venom. I. Effect on the Phrenic Nerve-Diaphragm Preparation of the Rat.** *J. Formosan Med. Ass.* 1960, May 28, v. 59, No. 5, 315–22, 4 figs. (3 on 2 pls.) [12 refs.] **II. Effect on Response of Rectus Abdominis Muscle of the Frog to Acetylcholine.** *Ibid.*, 416–22, 4 figs. [11 refs.]

WIENER, S. **Venom Yields and Toxicity of the Venoms of Male and Female Tiger Snakes.** *Med. J. Australia.* 1960, Nov. 5, v. 2, No. 19, 740–41.

Male tiger snakes appear to grow to a greater length than females. In addition the male snake yields a significantly greater volume of venom than the female snake of comparable length but there is no important difference in the toxicity of the two venoms as obtained from milking the venom glands. It was found that the venom expressed from the dissected venom glands of both male and female snakes was less toxic than that obtained by milking the glands or that expelled at the time of a natural bite. *H. J. Bensted*

SYMONS, H. S. **Anaphylactic Shock and Subsequent Dementia following the Administration of Tiger-Snake Antivenene.** *Med. J. Australia.* 1960, Dec. 24, v. 2, No. 26, 1010–11.

MICKS, D. W. **Insects and other Arthropods of Medical Importance in Texas.** *Texas Reports on Biol. & Med.* 1960, v. 18, No. 4, 624–35, 1 fig. [11 refs.]

It has been recorded that, during the 5-year period 1950–54, 215 deaths in the United States were attributed to venomous bites and stings [this *Bulletin*, 1960, v. 57, 68]. The highest incidence was in the state of Texas, in which 36 such fatalities occurred. This paper records a study of insects and arthropods of potential medical importance in this state. The method of enquiry was by questionary addressed to 1,000 local physicians, from whom 124 replies were relevant. The study period covered the years 1955–1959.

Wasp sting emerged as the most important danger, accounting for 290 patients who required treatment. The yellow jacket wasp (*Polistes* sp.) was the commonest aggressor. Severe systemic reactions due to anaphylaxis occurred in 43% of the victims, who often required urgent treatment with antihistamines and steroids. The honey-bee (*Apis mellifica*) inflicted stings

requiring treatment in 59 patients, among whom 42% showed anaphylactic shock.

75 patients "stung" by ants required treatment, and in 16% generalized symptoms occurred. Caterpillar sting accounted for 54 calls for treatment, the puss caterpillar or "tree asp" (*Megalopyge opercularis*) accounted for 80% of these. 7 patients were treated for bites by Reduviid or "kissing bugs" (*Triatoma* spp.) 5 of whom developed anaphylactoid symptoms. Mosquito bites, centipede stings and bites by a mite (*Eutrombicula alfreddugesi*) accounted for a few additional patients.

Scorpion stings required treatment in 27 patients, including 1 fatality from anaphylactic shock. The black widow spider (*Latrodectus mactans*) caused bites requiring treatment in 35 instances, in which the foremost symptom was abdominal colic. One elderly patient, bitten on the penis, succumbed despite steroid therapy. The bite of a brown spider, presumably of the genus *Loxosceles,* caused intense pain with local sloughing in 17 patients.

The author notes that of the 32 deaths due to envenomation in the period of the survey throughout the state of Texas, 66% were due to stings by *Hymenoptera,* the mode of death being anaphylactic shock.

J. H. Walters

JÜPTNER, H. Verletzungen durch Steinfische (*Synanceja trachynis*). [**Injuries from Stone-Fish** (*Synanceja trachynis*)] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 4, 475–7, 1 fig. [10 refs.]

See this *Bulletin*, 1959, v. 56, 1058, 1185.

TOXOPLASMOSIS

MAKSTENIEKS, O., VERLINDE, J. D. & RIS, A. Over het epidemiologisch verband tussen toxoplasmosis bij de hond, de kat en de mens. [**On the Epidemiological Relationship between Toxoplasmosis in the Dog, the Cat and Man**] *Tijdschr. v. Diergeneesk.* 1960, July 1, v. 85, No. 13, 781–94, 1 fig. [14 refs.] English summary.

In a previous paper on the relationship between human and animal toxoplasmosis [this *Bulletin,* 1958, v. 55, 448] it was shown that the presence of a recent infection can be assumed when the suspected sera show, in addition to a fairly high titre to the dye test, a positive complement-fixation test. In the present paper the authors describe a serological study—based on this criterion—of cases of human, canine and feline toxoplasmosis in Holland, observed in households where recent occurrence of the disease had been diagnosed in man or one of these animals. The results of this investigation are given in a series of tables.

It was found that the incidence of toxoplasmosis was higher in animals suffering from various disorders (especially cerebral and gastro-intestinal disturbances, and those affecting the eyes and muscles) than in those selected

at random, as well as in dogs from households where human cases of toxoplasmosis occurred. Conversely, cases of human toxoplasmosis proved to be significantly higher among persons who were in contact with infected dogs than among those taken at random. However, there was no clear evidence of correlation between cases of human and feline infection. The authors suggest that human toxoplasmosis might be acquired from infected dogs and cats, but it is also possible that there is a common source from which all three hosts became infected. *C. A. Hoare*

RIFAAT, M. A. & NAGATY, H. F. **Toxoplasmosis in Egypt—a Toxoplasmin-Skin-Testing Survey among a Group of Cairo Population.** *J. Egyptian Pub. Health Ass.* 1959, v. 34, No. 3, 121–35. [61 refs.]

The authors report the results of a survey for the incidence of toxoplasmosis in Cairo, carried out with the aid of the toxoplasmin skin test. The examination by this method of 334 persons, comprising hospital patients and technical personnel, revealed positive reactions in 54 (15·6%), with the following distribution according to age: nil in 2–9 years age-group, 6·6% in 10–19 group and 21% in those over 20. In a group of 60 schizophrenics the reaction was positive in 25%. *C. A. Hoare*

TALICE, R. V., PEREZ-MOREIRA, L., GURRI, J. & ROYOL, J. Intradermorreacción con toxoplasmina en adultos sanos residentes en Montevideo. [**Intradermal Test with Toxoplasmin in Healthy Adults residing in Montevideo**] *An. Facul. de Med. Montevideo.* 1960, v. 45, No. 1, 35–42, 10 graphs. [27 refs.] English summary.

The authors report the results of a survey for the incidence of toxoplasmosis in Montevideo, carried out with the help of Frenkel's toxoplasmin intradermal test on 383 apparently healthy adult persons. Among these, positive reactions were obtained in about 26%, the incidence being higher in females than in males and in persons from rural areas (29·5%) as compared with that of urban dwellers (23·5%). The number of positive reactions increased with age, from 14·4% in men and 29·5% in women aged 20–24 years to 41% in both sexes of persons between the ages of 35 and 50. *C. A. Hoare*

JIRA, J. & BOZDECH, V. Die Bedeutung der Komplementbindungsreaktion für die Laboratoriums-diagnostik der Toxoplasmose. [**Significance of the Complement-Fixation Test for the Laboratory Diagnosis of Toxoplasmosis**] *Zent. f. Bakt.* I. Abt. Orig. 1960, v. 179, No. 2, 262–77. [54 refs.]

The authors describe a standardized method of complement-fixation test (CFT) for the diagnosis of toxoplasmosis, based on 4 years' experience in the course of which 13,000 samples of sera were examined. *Toxoplasma* antigens were prepared from homogenized frozen parasites recovered from the peritoneal exudate of infected mice and from cultures on chorioallantoic membranes of chick embryos. The antigens were titrated against hyperimmune sera of rats

that had been repeatedly inoculated with peritoneal exudate of infected hamsters. In this way titres up to 1 in 5120 were obtained. Titration of haemolytic amboceptor and complement was carried out in a series of tubes the consecutive dilutions of which differed by 25%. Guineapig complement was preserved in a modification of Sonnenschein's fluid. In the main test a haemolytic system with 8 MHD and 1% RBC was employed.

In tests carried out with the sera of 987 healthy persons there were only 29·3 positive reactions at titres up to but not higher than 1 in 80, whereas in 2,816 tests on patients 971 (34·5%) were positive to titres from 1 in 80 to 1 in 1280, and in one case of a mother whose child was suffering from toxoplasmosis the titre was 1 in 5120. There was a marked increase of CF-positive reactions in cases of chorioretinitis and of habitual abortions. *C. A. Hoare*

KÖRTING, H. J. Toxoplasmose-Komplementbindungsreaktion mit ultraschallbehandelten Antigenen. **[Complement-Fixation Test with Toxoplasmosis Antigens treated with Ultrasonic Waves]** *Zent. f. Bakt.* I. Abt. Orig. 1960, v. 179, No. 2, 278–88, 4 figs. [25 refs.]

The author describes the production of highly concentrated *Toxoplasma* antigen for complement-fixation tests (CFT) by exposing saline washings of peritoneal exudate of infected mice to ultrasonic waves of high frequency (10 W/cm.^{3}). Antigens obtained by this method were tested by CFT against various immune sera. The titre of such antigens proved to be up to 10 times higher than that from antigens of untreated peritoneal exudates, so that in samples of patients' sera much lower antibody titres can be demonstrated with ultrasonically treated antigens. The antigenicity of toxoplasms at first rises in proportion to the duration of ultrasonic treatment, reaching a maximum after 12 minutes but declining if treated for a longer period. However, in cell-free exudates exposure to ultrasonic waves brings about a decrease in antigenicity. *C. A. Hoare*

PATERSON, M. W. **Toxoplasmosis in Children. A Report of 12 Cases.** *Scottish Med. J.* Glasgow. 1960, Nov., v. 5, No. 11, 467–76, 4 figs. [22 refs.]

Congenitally acquired toxoplasmosis may present in the child within the first 2 years of life as (a) a choroiditis, which is characteristically bilateral with a macular localization, or (b) involvement of the brain. Microcephaly, hydrocephalus, convulsions and mental deficiency are often associated with radiologically demonstrable intracranial calcification in the form of curvilinear streaks. [A punctate periventricular calcification is an alternative finding.] Other rarer manifestations are jaundice, hepatosplenomegaly, erythroblastosis with a negative Coombs test, purpura, a diffuse maculopapular rash and anaemia. In the acquired disease, in older children, a generalized febrile lymphadenopathy may result.

In the differential diagnosis of the congenital disease, syphilis, tuberculosis and cytomegalic inclusion encephalitis must be considered. Definitive diagnosis may be achieved by the isolation of *Toxoplasma gondii* in hamsters and white

mice inoculated with cerebrospinal fluid from the affected child. Antibodies may be detected by the dye test of Sabin and Feldman or by a complement-fixation [CF] technique. The former is more sensitive and persistent but requires the use of living cultures of the protozoon, whereas the latter utilizes a killed suspension.

It should be remembered that 20–40% of the adult population of Great Britain carry such antibodies [this *Bulletin*, 1957, v. 54, 1121], and that the passive transference of antibodies across the placenta, in the absence of actual foetal infection, may give rise to positive results in the first 6 months of life, though in decreasing titre. A single finding of high titre antibodies, or of a rising titre, in young children is, however, of high significance.

It is probable that transmission of toxoplasmosis to the foetus can only occur during the initial parasitaemia of the mother, and no case has been recorded of a mother giving birth to successive infected infants.

During the period 1948–1959 toxoplasmosis was eventually recognized in 12 children admitted to the Royal Hospital for Sick Children in Glasgow. In only one patient the infection was judged to have been acquired post-natally. The individual case histories are described in detail and the principal findings are tabulated as follows: choroiditis in 8, microphthalmus in 6, intracranial calcification in 6, hydrocephalus in 3, microcephaly in 4, other neurological complications in 7, mental deficiency in 4, hepatosplenomegaly in 3 and neonatal purpura in 3 patients.

Serological reactions to a titre in excess of 1 in 16 to the dye test or 1 in 4 in the CF test and usually both were demonstrated in both child and mother in all but the oldest child. This last patient, aged 10 years, developed cervical lymphadenopathy with tenderness of the liver; his serum showed rising titres of antibody by each test and his symptoms subsided on treatment with sulphadiazine 1 gm. and pyrimethamine 25 gm. daily for 40 days. The serological tests in his mother were negative and it was therefore evident that in his case the infection was of recent acquisition.

The source of infection could not be determined in any instance, though in one household a sick cat had been destroyed during the mother's pregnancy.

J. H. Walters

REMINGTON, J. S., MELTON, Marjorie L. & Jacobs, L. **Chronic Toxoplasma Infection in the Uterus.** *J. Lab. & Clin. Med.* 1960, Dec., v. 56, No. 6, 879–83, 2 figs.

Because the presence of toxoplasm cysts was demonstrated in the wall of a uterus obtained at autopsy [this *Bulletin*, 1959, v. 56, 655], examination was made of 23 uterine specimens produced by hysterectomy from women who had positive toxoplasm dye tests of low and stable titre. 3 cases were found positive, toxoplasm cysts being shown by digestion and mouse inoculation of the uterine tissue. 2 of the women had had children and in neither family was there clinical evidence of toxoplasmosis; but the third woman had had no viable offspring from 8 pregnancies.

The relationship of these findings to human toxoplasmosis is discussed without definite conclusions being reached. *I. A. B. Cathie*

DERMATOLOGY AND FUNGUS DISEASES

BALL, O. G., LUMMUS, F. L., SIGREST, M. L., BUSEY, J. F. & ALLISON, F., Jr. **An Immunologic Survey for Systemic Fungus Infections in General Hospital Patients of Central Mississippi.** *Amer. J. Hyg.* 1960, Sept., v. 72, No. 2, 231–43. [15 refs.]

In the course of a comprehensive immunological survey in the Mississippi basin designed to obtain information regarding the incidence of histoplasmosis, coccidioidomycosis, North American blastomycosis and tuberculosis in that area, the authors used, besides X-ray examinations, skin tests, complement-fixation tests and agar diffusion tests. They had particularly in mind the question whether a subclinical reservoir of blastomycosis could be found.

The results of these tests, which were carried out on general hospital patients, showed that, whereas all patients skin-tested with blastomycin responded negatively, 4 patients had complement-fixation titres of 1 in 8 or higher against blastomycin, while 17 produced sera with strong precipitating antibody titres when tested against crude blastomycin antigen.

That these precipitation reactions were not due to histoplasmosis was shown by the negative reaction of these sera to histoplasmin.

Encouraged by these results, the authors venture the suggestion that agar diffusion tests might serve a useful purpose in detecting subclinical asymptomatic North American blastomycosis.

The findings, including those with histoplasmin, coccidioidin and PPD, are shown in 5 tables. *C. J. La Touche*

HOWARD, D. H. & HERNDON, R. L. **Tissue Cultures of Mouse Peritoneal Exudates inoculated with** *Blastomyces dermatitidis.* *J. Bacteriology.* 1960, Oct., v. 80, No. 4, 522–7, 6 figs. [11 refs.]

It was shown by the senior author in a previous communication [*Bull. Hyg.*, 1960, v. 35, 32], that in its behaviour as an endoparasite of cells of the reticulo-endothelial system *Histoplasma capsulatum* differs from other fungi which are pathogenic for man.

As *Blastomyces dermatitidis* is also a dimorphic pathogen the authors extended their previous studies to include this organism. Results showed that, not only were the yeast phase cells of *B. dermatitidis* present in the macrophages of the tissue culture, but that they exerted a destructive effect upon them and that this was directly related to their capacity for proliferation within these cells as well as outside them. It was shown, furthermore, that when these macrophage cultures were inoculated with hyphal fragments of the mycelial phase of this organism, conversion to the yeast phase took place, and that the sequence of changes in the hyphae during this conversion was almost identical with that found previously in the case of *H. capsulatum.*

C. J. La Touche

MADDY, K. T., CRECELIUS, H. G. & CORNELL, R. G. **Distribution of** *Coccidioides immitis* **determined by testing Cattle.** *Pub. Health Rep.* Wash. 1960, Oct., v. 75, No. 10, 955–62, 4 figs. [26 refs.]

Since cattle in areas endemic for coccidioidomycosis become infected with this disease as well as human beings the authors set themselves the task of determining the distribution of those which were infected within these areas. For this purpose they used the method of skin testing with coccidioidin in various areas in the 14 counties of Arizona.

The results of this survey are extremely interesting since they show that 24·6% of 11,643 cattle so tested were positive and "revealed rather definite boundaries and the relative infectivity of various parts of the endemic area. . .". It was found, furthermore, that the boundaries of the endemic area as indicated in this manner practically coincided with those of the climatic zone known as the Lower Sonoran Life Zone which "reaches its coldest limits at just above 5,000 feet"; but areas below 1,000 feet were shown to be too dry "for good propagation of this fungus".

It was found also that in certain counties included within the endemic area the conversion rate to positives among cattle was almost identical with that found in human beings. The authors accordingly conclude that a study of the conversion rates in cattle could be utilized to indicate the conversion rates to positives in the human population of endemic areas. *C. J. La Touche*

GONZÁLEZ, J. Lepra y coccidioidomicosis. Estudio de un caso con ambos padecimientos. [**Leprosy and Coccidioidomycosis in the Same Patient**] *Dermatología*. Mexico. 1960, June, v. 4, No. 2, 113–19, 2 figs. English summary (8 lines).

The author reports in detail the clinical, histopathological and therapeutic features of a case seen in Monterrey, Mexico, in which the patient showed lesions at different sites diagnosed respectively as coccidioidomycosis and borderline leprosy; the first condition was confirmed by histological examination which included identification of *Coccidioides immitis* in the lesion; the leprosy was confirmed by the histopathological appearances only.

The patient was treated for leprosy with Avlosulphone and for coccidioidomycosis with Amphotericin B, with good results, after lack of success with various other preparations. *H. J. O'D. Burke-Gaffney*

TROPICAL OPHTHALMOLOGY

JAWETZ, E. & HANNA, L. **Trachoma Viruses isolated in the United States. 2. Assay of Egg Infectivity and Stability.** *Proc. Soc. Exper. Biol. & Med.* 1960, Nov., v. 105, No. 2, 207–10, 1 fig. [14 refs.] **3. Strain Specific Effects of Tetracycline and Penicillin.** *Ibid.*, 320–23, 2 figs. [11 refs.]

i. Working with 3 strains of trachoma virus—BOUR, ASGH, APACHE—isolated in the United States [this *Bulletin*, 1960, v. 57, 1114], the authors found that titration in 7-day embryonated eggs by the yolk sac route provided a reliable and reproducible assay of their infectivity. These strains rapidly became inactive when exposed to a temperature of 37°C. or higher and all

3 were ether-labile. An interesting, though unexplained, observation was that they lost their ability to stain by Macchiavello or Giemsa at concentrations of sodium deoxycholate very much below those required to affect their infectivity.

ii. The effect of penicillin and tetracycline on 3 strains of trachoma virus isolated in America [above] was studied in eggs. All 3 were susceptible to both antibiotics but they showed considerable variation in this respect; their behaviour, though individual, was reproducible. *S. P. Bedson*

WOOLRIDGE, R. L. **A Complement Fixation Antigen for the Serological Diagnosis of Trachoma.** *J. Formosan Med. Ass.* 1960, June 28, v. 59, No. 6, 355–63. [15 refs.]

4 strains of trachoma virus and 1 each of psittacosis and LGV viruses, grown in the yolk sac of chick embryos, were used for the preparation of group and specific antigens. The former were made by the method of NIGG and the latter—purified elementary body preparations, or PEB—by trypsinization of crude virus suspensions followed by fractional centrifugation and further purification by treatment with polymyxin B.

Complement-fixation tests made with the group antigens and antisera prepared in animals confirmed the presence of a common antigenic factor in these 3 virus species. The trachoma PEB when tested with sera from human cases of trachoma, psittacosis and LGV behaved strictly specifically, but the psittacosis and LGV PEB antigens, though giving no fixation of complement with trachoma sera, cross-reacted more or less to titre with sera from cases of psittacosis and LGV. Extensive tests made on sera of trachoma patients from Taiwan, India, Egypt and Ethiopia with the PEB trachoma antigen revealed specific antibody in from 30 to 75%, its presence and titre being correlated with the duration and severity of the disease.

[The mode of producing the specific antigens is somewhat surprising since it entails enzyme action on the undisrupted elementary bodies and the use of an enzyme, trypsin, which has been thought to be without action on the group antigen of these viruses.] *S. P. Bedson*

WERNER, G. H. Recherches expérimentales sur la chimiothérapie du trachome. [**Experimental Chemotherapy of Trachoma**] *Ann. Inst. Pasteur.* 1961, Jan., v. 100, No. 1, 93–108, 1 fig. [19 refs.]

This work was done with 2 strains of trachoma virus—Tang and G1—and the chemotherapeutic activity of the compounds tested was determined in embryonated eggs by the yolk sac route and in mice infected intracerebrally and given the preparations by mouth or subcutaneously; only the strain Tang was used in tests by the latter method. The tetracyclines and some of the sulphonamides—sulphadiazine, sulphamethopyrazine and sulphamerazine—proved highly active. Penicillin G and chloramphenicol were active in the egg, but were without effect in the mouse. Streptomycin and neomycin were devoid of antitrachoma activity. *S. P. Bedson*

TROPICAL ENVIRONMENTAL CONDITIONS

O'Brien, J. P. **The Pathogenesis of Anhidrotic Asthenia. An Aspect of Heat Intolerance.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, May, v. 54, No. 3, 235–41, 2 figs. on pl. & 1 chart. [23 refs.]

The author reviews evidence for the two opposing theories of the origin of anhidrotic asthenia [this *Bulletin*, 1949, v. 46, 780; 1951, v. 48, 923; 1957, v. 54, 1125, 1242] and concludes that the asthenia is caused by peripheral blockage of eccrine sweat gland ducts rather than by central defect in thermoregulation.

The distribution of anhidrosis is patchy, usually avoiding the face where, indeed, hyperhidrosis is the rule. The appearance of miliaria profunda (mammilaria) in relation to the eccrine sweat pores while the patient is hot indicates that the rash is due to poral closure with retention of sweat. This is confirmed by histological studies and by the return of sweating after a desquamating agent has removed the obstructing layers of the epidermis.

It is not necessary to invoke upset of pituitary anti-diuretic function to explain the polyuria which is a frequent feature of this condition; polyuria would be expected to accompany defective sweating unless fluid intake was restricted. Indeed the picture here is similar to that seen in congenital absence of sweat glands.

There is further disagreement as to the cause of miliaria rubra (prickly heat) from which miliaria profunda develops. Miliaria rubra is believed by most authors to arise from physical obstruction of the sweat pore; the present author thinks that bacterial infection plays a part. It is agreed by all that physical agents, *e.g.*, sunburn, produce the superficial type of poral closure called crystallina which may be a factor in producing miliaria rubra or even anhidrotic asthenia. *M. L. Thomson*

MISCELLANEOUS DISEASES

Loddo, B. & Fenu, G. Indagini sierologiche in soggetti affetti da scleroma. [**Serological Investigations in Patients with Scleroma**] *Nuovi Ann. d'Igiene e Microbiol.* 1960, Sept.–Oct., v. 11, No. 5, 397–408.

The authors recovered *Klebsiella scleromatis* from 5 out of 7 patients with rhinoscleroma and they describe the technique which they followed in making cultures of the organism and in the subsequent serological investigations. They found agglutination reactions to be of little help but haemagglutination and complement-fixation tests have a diagnostic value and are capable of detecting somatic and capsular antibodies for *Klebsiella*. It is the latter which are specific, and the authors have found, by haemagglutination, that many healthy persons may have somatic antibodies for *K. scleromatis*.

In the demonstration of capsular antibodies, which are specific, haemagglutination is more sensitive than the complement-fixation test: the

somatic antibody must first be removed in each case. In some cases of rhinoscleroma, histologically confirmed, the capsular antibodies may be found to be at a very low titre or even absent. *J. Cauchi*

POLI, D., LAURENT, J., GRANOTIER, E. & MARQUE, J. Contribution à l'étude des cirrhoses non éthyliques du musulman marocain. [**Non-Alcoholic Cirrhosis in Muslims in Morocco**] *Maroc Méd.* 1960, Oct., v. 39, No. 425, 1042–51, 6 figs. [Numerous refs.]

Cirrhosis of the liver, of non-alcoholic origin but resembling a post-viral cirrhosis, occurs in the Muslim population of Morocco. In one survey of 1,423 patients at Casablanca, 31 (2·17%) were found to have cirrhotic livers; at Marrakesh, 65 cases of cirrhosis were seen in one year by the authors and these accounted for 4% of hospital inmates—58 of these patients were Muslim.

Details of 21 patients, of ages ranging from 15 to 65 years, are given; all suffered from ascites, which was a chief reason for their admission to hospital. Splenoportography, liver function tests and other examinations revealed an atrophic cirrhosis in 17 of the patients, 4 had a hypertrophic cirrhosis; 18 had splenomegaly. Their condition was consistently poor with every evidence of grave and prolonged malnutrition. The development of the cirrhotic condition and its sequelae was slow, signs of hypersplenism commonly developed in the Muslims affected, and a fatal termination was almost invariable.

The authors' studies of the diets in various parts of the country point to inadequate diet, both in respect of quantity and constitution, as the primary cause of the cirrhosis; but intestinal parasitizations, the practice of eating earth, chronic infections and virus infections could be contributory, though their part in the development of the syndrome cannot be determined with exactitude. The condition is similar to that encountered elsewhere in the undeveloped countries of the world. *A. R. D. Adams*

CORDERO Z., R., ISRAEL S., J. & SALAS C., J. Estudio de un grupo de casos con cardiopatía de origen oscuro. [**Study of a Group of Cases with Cardiopathy of Obscure Origin**] *Acta Méd. Costarricense.* 1960, May–Aug., v. 3, No. 2, 99–111, 5 figs. on 2 pls. [12 refs.] English summary.

The authors, from the San Juan de Dios Hospital, Costa Rica, describe in detail and tabulate the results of clinical, laboratory, electrocardiographic, radiological and pathological examination of 8 patients with heart disease of unknown cause. The interest to readers of this *Bulletin* lies in the fact that while 5 of them appeared to be endocardial fibroelastosis, the other 3 showed no elastosis and resembled endomyocardial fibrosis, as described in Africa and elsewhere and with which readers will be familiar.

H. J. O'D. Burke-Gaffney

KHALEQUE, K. A., MUAZZAM, M. G. & CHOWDHURY, R. I. **Examination of Sputum for Eosinophils.** *J. Trop. Med. & Hyg.* 1960, Dec., v. 63, No. 12, 291–2.

It has been established that in tropical eosinophilia there are patchy cellular infiltrations in the lungs in which the eosinophil cells predominate. It is in

this condition, as well as in asthma, that eosinophils have been demonstrated in the sputum for diagnostic purposes. Although demonstration of eosinophils in the sputum constitutes an accessory factor in diagnosis, cases have been observed with pulmonary symptoms, suggestive radiological findings, and a circulating eosinophil count far below the generally accepted diagnostic level, but with large numbers of eosinophils in the sputum. Sputum examination for eosinophils is useful in distinguishing radiologically suggestive idiopathic eosinophilia from pulmonary tuberculosis with high circulating eosinophils and no tubercle bacilli in the sputum. As a general rule asthmatic patients, who may also have eosinophils in the sputum but no eosinophilia, respond dramatically to prednisolone.

In this study, from the Medical College, Dacca, East Pakistan, 24-hour, overnight, and random specimens of sputum were collected with, or without, 10% formol-saline as a preservative. For stains Leishman, Giemsa and yellow eosin were employed. The sputum, in a conical glass, was allowed to stand for one hour, after which two-thirds of the supernatant fluid was discarded and the rest was poured into a Petri dish. The suspected fragments were picked out. Wet coverslip preparations were made by placing a portion on a slide and adding a drop of stain. After defragmentation the material was examined immediately, and also at intervals of 10 minutes, for 4 hours. Permanent preparations were dried in air and stained. Fixed smears are, however, not so satisfactory, because their distribution is not uniform: fresh, random specimens gave the best results.

Eosinophils gradually degenerate in sputum at room temperature. Typical fragments consist of masses of eosinophils with a few pus cells, epithelial cells and débris.

Results are expressed as few, fair, moderate or large numbers. Histological study of a lung biopsy from a case of tropical eosinophilia showed masses of eosinophils in the interstitial tissue, alveoli and blood vessels. It is probable that the eosinophilic fragments in idiopathic tropical eosinophilia are formed in the alveoli.

This paper records methods. No details are given of individual cases or the numbers examined. *Philip Manson-Bahr*

PARASITOLOGY: GENERAL

STAUBER, L. A. [Edited by.] **Host Influence on Parasite Physiology.** pp. vii+96, illustrated. [Numerous refs.] 1960. New Brunswick: Rutgers University Press, 30, College Avenue, N.J., U.S.A. [$2.00.]

This is a record of a conference held at Rutgers University, New Jersey, in 1959. During the last 20 years many more workers than before have studied the physiology of parasites, and the instruments utilized for such work have become more complicated. Since the papers themselves summarize many publications it is not possible to reproduce them in abstracts. Instead, some of the chief points of interest for the medical parasitologist will be described.

The first paper by L. R. CLEVELAND (*Effect of Insect Hormones on the Protozoa*, pp. 5–10) discusses the protozoa found in the gut of the roach *Cryptocercus* and termites. These are important to their host in the catabolism and digestion of wood. It is important for these protozoa to time their sexual reproduction to fit the moults of their host. This is coordinated by the protozoa being sensitive to the hormones of the host concerned with moulting. Injection of the hormone, ecdysone, causes the protozoa to begin their sexual cycles.

In the second paper (*Some Aspects of Research on Trypanosomes*, pp. 11–23) J. D. FULTON describes researches on trypanosomes. He discusses the relations of *T. brucei*, *T. gambiense*, and *T. rhodesiense* and also the polymorphism of these species. He then goes on to the cytoplasmic inclusions which are seen in trypanosomes. These granules probably contain ribonucleic acid. Fluorescent drugs such as stilbamidine are absorbed by the granules and cause them to shine brilliantly under ultra-violet illumination. Attempts have been made by Fulton to show interchange of genetic material between trypanosomes, by isolating deoxyribonucleic acid from Atoxyl-resistant trypanosomes and incubating it with normal trypanosomes. The results obtained were equivocal.

R. E. HUNGATE (*Factors influencing the Rumen Protozoa*, pp. 24–40) describes factors influencing the protozoa of the cow's rumen.

A. R. TIMMS (*Schistosome Enzymes*, pp. 41–49) discusses the enzymes of schistosomes. This paper will be valuable to those who are interested in the biochemistry of trematodes.

D. FAIRBAIRN writes on the *Physiologic Aspects of Egg Hatching and Larval Exsheathment in Nematodes* (pp. 50–64). In the case of *Ascaris* the embryo requires about 17 days at 30°C. with a free supply of oxygen for its initial development (embryonation). Then in the presence of 4 factors, *viz.* a reducing agent, *p*H approximately neutral, 5% carbon dioxide, and a temperature of 35–43°C., the embryo is induced to produce enzymes which dissolve the egg-shell so that it can emerge and escape. The first stage is to make the vitelline membrane permeable; the enzymes include chitinase and probably lipase.

In the case of *Trichostrongylus*, the larvae form a dense sheath after the second moult and they do not emerge except under conditions resembling those in the cow's alimentary canal. In this case stimulation from the host causes the larvae to produce an "exsheathing fluid" from the excretory pore; this is synthesized inside the larvae in the part between the excretory pore and the posterior end of the oesophagus. The stimulus from the host which is appropriate for this purpose varies with the worm and its usual site in the gut, and it is arranged so as to produce exsheathment in a place favourable for the larvae to develop. Thus *Haemonchus* exsheathes in the rumen and matures in the next lower segment, the abomasum; while *Oesophagostomum* exsheathes in the small intestine and matures in the next lower segment, the large intestine.

P. P. WEINSTEIN writes on the *Excretory Mechanisms and Excretory Products of Nematodes* (pp. 65–92). The so-called excretory system of nematodes probably is really excretory in function, but there is surprisingly little evidence to prove this. In *Nippostrongylus* filariform larvae, the pulsation of the excretory pore ampulla is inversely related to the solute concentration of the environmental fluid, which indicates that fluid is being excreted to maintain an appropriate osmotic pressure inside the worm. Further evidence of the

excretory products is given by the precipitates which form round the excretory pore when worms are placed in antisera or in solutions of certain chemicals like quinone. The products may include urea. BEHRENZ (*Ztschr. f. Wissensch. Zool.*, 1956, v. 159, 129) has shown that if Ascaridina are placed in solutions of fluorescin, fluorescent dyes are rapidly excreted through the excretory pore. A detailed description is given of the lateral excretory canals which are intracellular channels within what appears to be a single enormous cell. Excretions also take place through the digestive tract as has been shown by worms suspended with their heads in one arm of a U-tube, and their tails in another. This paper forms a valuable review which should be consulted further in the original by those interested.

Altogether these papers form a valuable survey of many aspects of parasite physiology.

The conference opened with introductory remarks by Theodor VON BRAND and closed with concluding remarks by Ernest BUEDING. *F. Hawking*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

COMMONWEALTH INST. ENTOM. **Report of the Seventh Commonwealth Entomological Conference, 6th–15th July 1960.** pp. iii+399, illustrated. [Numerous refs.] 1960, Dec. London: 56, Queen's Gate, S.W.7. [50s.]

There are 3 main sections of this Report. The first is an account of the arrangements of the Seventh Commonwealth Entomological Congress, the conclusions and resolutions of the Committees held during the Congress, which included discussion of the problems relating to the abstraction of literature for *The Review of Applied Entomology*, and a review of the work and problems of the Commonwealth Institutes of Entomology and Biological Control.

The second section contains the papers read, and the subsequent discussions, at the Congress. Recent advances and current trends in the study and control of tsetse flies and trypanosomiasis were reviewed by J. FORD (p. 125) and K. S. HOCKING (p. 128). The emphasis in recent research work is on the resting places of the adult fly with the possibility of control by localized application of dieldrin at the resting places, and the numbers, habits and infection of the biting fly, to which is related the use of drugs as prophylactics when cattle are pastured in tsetse infested areas. Blanket applications of insecticide from the air or ground have proved no more expensive than other methods of control in East Africa and the spraying of cattle with dilute emulsions of dieldrin has given promising results. The view that the present aim of research is the economic use of prophylactics, and not the elimination of the fly, was criticized by W. H. POTTS (p. 131) in the discussion. T. A. M. NASH (Chairman) suggested that standardization and detailing of the items of cost of control measures should always be given and are very relevant to discussions of the best methods of control. The problems and hazards of using insecticides were

discussed by A. B. HADAWAY (p. 45), J. M. BARNES (p. 51) and E. J. MILLER (p. 52), Hadaway emphasizing the importance of information about the habits of the insect and the formulation of the insecticide to give the best possible control. The examples of the control of *Glossina morsitans* in Uganda by discriminative treatment with insecticide of the trunks and branches of one species of tree, *Acacia gerrardi*, and the use of Cereclor resin with BHC on sorptive surfaces in malaria control in Africa are cited as examples.

The other papers given at the Congress are not directly concerned with the vectors of disease but they relate to general problems, such as the dispersion of insects and the use of pathogenic organisms in control, or to malnutrition, in the papers devoted to the pests and the vectors of disease of human food.

The third section is a review of work on economic entomology in the countries of the Commonwealth (excluding India) between 1954 and 1959, and includes reports from the East African Trypanosomiasis Research Organization, the West African Institute for Trypanosomiasis Research, the Institute for Medical Research in Malaya and the Federal Ministry of Health Malaria Service, Nigeria. These are best examined in the original publication, which is a very valuable survey of current work in economic entomology throughout the Commonwealth. *B. R. Laurence*

SACCÀ, G. Contributo alla conoscenza delle *Myzomyia* del Sud Marocchino. [**A Contribution to the Knowledge of** *Myzomyia* **sp. in South Morocco**] *Riv. di Parassit.* Rome. 1960, Dec., v. 21, No. 4, 319–22, 2 figs. [18 refs.] English summary (5 lines).

This also appears in this *Bulletin*, 1961, v. 58, 410.

MOUCHET, J., ELLIOT, R., GARIOU, J., VOELCKEL, J. & VARRIERAS. J. La résistance aux insecticides chez *Culex pipiens fatigans* Wied. et les problèmes d'hygiène urbaine au Cameroun. [**Resistance of** *Culex pipiens fatigans* **to Insecticides and the Problems of Urban Sanitation in the Cameroons**] *Méd. Trop.* Marseilles. 1960, July–Aug., v. 20, No. 4. 447–56.

Before the introduction of insecticides, the control of mosquitoes in the South Cameroons was carried out by the old control measures, which were directed mainly against the larvae in order to interrupt the malaria and the yellow fever cycles. These measures included the treatment of marshes with oil, drainage, construction and maintenance of gutters, the regulation of water courses and *marigots*, filling up the depressions, etc., on the one hand and a strict inspection of properties to eliminate breeding sites on the other hand.

In 1952, the houses of the large cities in the South Cameroons were subjected to treatment with DDT and dieldrin. At the same time general measures of hygiene against the larvae were carried out. 3 years later, populations of mosquitoes, mostly culicines, reappeared in Yaoundé, Douala, Bafia and Mbalmayo. In 1959, *Culex* populations, especially *Culex pipiens fatigans*, had increased over the populations prevalent in the pre-treatment time. The anophelines (*A. gambiae*, *A. moucheti* and *A. nili*), on the contrary, were considerably reduced [VOELCKEL and MOUCHET, this *Bulletin*, 1959, v. 56, 1108].

The authors tested the adults and larvae of *C. p. fatigans*, using the Busvine-Nash test and the WHO method, respectively. The adults were highly resistant to DDT and the larvae were 20 times as resistant as the Lagos susceptible strain. 33% of the larvae and adults from Douala and Yaoundé were completely resistant to dieldrin. Although BHC was not used very often, the larvae were found to be 30 times less susceptible than the normal strain to this insecticide. The larvae were also resistant to the organo-phosphorus insecticides used: diazinon and malathion.

After the use of insecticides in the South Cameroons and after the adequate elimination of yellow fever by vaccination and house treatment, the protective measures were neglected. This resulted in the creation of many breeding sites which were difficult to control with the no longer effective insecticides.

Accordingly, the authors attributed the increase of *Culex* populations to the development of insecticide resistance, the insufficient measures of hygiene and probably the increase of the biotic potential.

Hygienists do not place much reliance on chlorinated insecticides to control the mosquitoes in the Cameroons and they suggest a return to the old control measures, which could be supported by increasing the public health knowledge of the inhabitants and including public health education in school programmes.

A. M. Guneidy

RAI, L. & LEWALLEN, L. L. **Effect of Varying Depths of Water with Identical Surface Area on Mosquito Larval Mortality using Commercial Malathion and Parathion Emulsion Concentrates.** *Mosquito News*. 1960, Sept., v. 20, No. 3, 271–4.

The amount of larvicide applied to bodies of water in the field is usually calculated on the basis of surface area alone. However, it is known that in the laboratory the mortality of mosquito larvae varies according to the conditions under which the tests are carried out. [See, for example, SCHMIDT and WEIDHAAS, this *Bulletin*, 1959, v. 56, 666; 1960, v. 57, 854.] In this paper the authors have investigated the effect of varying depths of water on the mortality of larvae exposed to insecticides.

Fourth instar larvae of *Culex pipiens quinquefasciatus* [*fatigans*] were exposed to emulsions of malathion or parathion in one gallon jars of identical size. Jars with water at depths of 2·5, 5·0, 7·5, 10·0, 12·5 and 15 cm. were set up. 430 ml. of water gave a depth of 2·5 cm. and each successive 475 ml. increased the depth by a further 2·5 cm. Although the depth was varied the surface area of the water was held constant. Malathion and parathion were each tested at two concentrations (calculated on the basis of surface area) at each depth. Malathion was applied at 0·3241 and 0·4140 mgm./cm.^{2} and parathion at 0·0065 and 0·0084 mgm./cm.^{2}

In all the tests increased depth, and consequently increased volume, resulted in lowered mortality. At the 15 cm. depth, 1·3% was the highest kill recorded. At 2·5 cm. the percentage mortality varied from 35·3 to 91·0 according to the insecticide and concentration used. The results indicate that the mortality of the larvae is inversely related to the volume of the medium. Evidence is also presented which suggests that the insecticides were more or less homogeneously distributed in the water; parathion was less evenly distributed than

malathion. These conclusions are supported by the results from a second series of experiments where the weight of malathion per unit surface area was increased proportionately as the volume and depth of water were increased. In these experiments the larval mortality did not vary with increasing depth.

The authors suggest, in conclusion, that the depth of the water—and not only the surface area—should be considered when doses of larvicide to be applied in the field are calculated. This would be especially important when the formulation used is expected to be homogeneously distributed in the water.

B. C. Fine

THEODOR, O. Die Fliegen der Palaearktischen Region. 9c. Psychodidae–Phlebotominae. [**Phlebotominae of the Palaearctic Region**] 55 pp., 95 text figs. & 21 figs. on 4 pls. [15 refs.] 1958. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller).

This account, in German, of the sandflies of the Palaearctic Region begins with an illustrated description of the characters used in classification. Five pages are devoted to biology, importance, control and methods of collecting and preparation. In the main, systematic, part of the work the species are grouped into two genera, *Phlebotomus* and *Sergentomyia,* and 11 subgenera. The author has given subgeneric status to 3 of the groups of *Sergentomyia* which he had previously designated by names of species [this *Bulletin*, 1948, v. 45, 934]. There are keys to the genera, subgenera and males and females of the species, and descriptions of the species and subspecies with short notes on their distribution and many figures of structures used in identification. *P. chinensis* Newstead is divided into 7 subspecies of which 4 are named for the first time. The work concludes with a short bibliography, an index to genera, subgenera, species and those synonyms which are mentioned, and 21 photographs including 15 showing pharyngeal characters.

It remains to be seen if the arrangement of genera and subgenera used here, or any other system, is universally accepted, but in any event Professor Theodor has made a valuable contribution to the study of the Phlebotominae which will help workers not only in the Palaearctic Region but in the Ethiopian and Oriental Regions as well, because no less than 18 of the species treated occur in one or the other or both.

D. J. Lewis

BRIGGS, J. D. **Reduction of Adult House-Fly Emergence by the Effects of *Bacillus* spp. on the Development of Immature Forms.** *J. Insect Pathol.* New York. 1960, Dec., v. 2, No. 4, 418–32.

The experiments were made with material from laboratory cultures of bacilli and also with a commercially available *Bacillus thuringiensis* spore powder [this *Bulletin,* 1960, v. 57, 959]. The tests with laboratory cultures added to fly breeding medium showed that only certain strains of *B. thuringiensis* var. *thuringiensis* were effective in stopping fly development from eggs and reducing emergence when 1st stage maggots were added. Two of the strains and also *B. thuringiensis* var. *sotto* were without effect. Experiments showed that the whole culture filtrate of an active strain was able to suppress fly breeding; this

indicates the presence of a soluble product, toxic for flies, produced by the bacteria.

When the commercial *B. thuringiensis* powder (5×10^9 spores/gm.) was added to hen-feed, the birds ate readily and, at the end of all the experiments, showed no ill effects. The powder was given at different rates from 0·5 up to 20 gm./hen/day. Subsequently, samples of the faeces were infected with 1st stage fly maggots. Throughout the range there was suppression of fly emergence varying from 50% to 99%, but no correlation with dosage.

In two small field trials, hens were fed with 4 gm. per day of the commercial spore product. At one site there was moderate, and at the other slight, reduction of flies breeding in the faeces.

The author believes that this method of fly control is promising, though only at an experimental stage. [See also HARVEY and BRETHOUR, this *Bulletin*, 1961, v. 58, 533.] *J. R. Busvine*

WATTAL, B. L. & KALRA, N. L. *Pyralis pictalis* **Curt. (Pyralidae: Lepidoptera) Larvae as Predators of Eggs of Bed Bug,** *Cimex hemipterus* **Fab. (Cimicidae: Hemiptera).** *Indian J. Malariology*. 1960, Mar., v. 14, No. 1, 77–9, 2 figs. on pl.

Bed bug populations have increased in India, especially in humid and warm places, in spite of the regular use of residual insecticides for malaria control. RAO and HALGERI [this *Bulletin*, 1957, v. 54, 99] found that bed bugs from regularly treated areas in Kolaba District of Bombay State had developed resistance to DDT during the period 1952–55. They pointed out that the development of DDT resistance, change in behaviour to avoid the treated surfaces, or the destruction of the natural enemies of the bed bugs are probably among the causes of the increase in density of this insect.

The authors noticed during 1959, with the onset of the rainy season, that two colonies of the bed bug *Cimex hemipterus* at the Malaria Institute of India were decreasing in numbers. Careful examination of the cages revealed the presence of lepidopterous larvae; the moth was identified as *Pyralis pictalis* (Pyralidae: Lepidoptera). Their investigations showed that these larvae devoured the eggs of bed bugs readily and not the nymphal stages.

This moth and others of the family Pyralidae are well-known pests of stored products in India. Since grain and vegetables in rural India are stored in or adjacent to the living-room, the authors came to the conclusion that the elimination of this predator by residual sprays, together with the development of resistance to insecticides in bed bugs, might account for the increase in bed bug populations in India.

The authors propose further study to show if there is any change in the biotic potential of the bed bug due to the development of insecticide resistance and to determine the most efficient pyralid species as a natural predator of bed bugs. *A. M. Guneidy*

ANSARI, M. A. R. **Mites in relation to Human Welfare.** *Pakistan J. of Health*. 1960, Apr., July & Oct., v. 10, Nos. 1, 2 & 3, 1–27; 94–125; 145–81, 55 figs. [25 refs.]

COLONIAL OFFICE. **Colonial Research 1959–1960. Colonial Pesticides Research Committee. Thirteenth Annual Report (1959–1960)** [GARNHAM, P. C. C., Chairman] (pp. 233–60). Cmnd. 1215. 381 pp. 1960. London: H.M. Stationery Office. [17s.]

After a general note about the movements of staff, etc., the report summarizes very briefly some of the research programmes under the aegis of the Committee. Some of these may be mentioned, as follows:—

At the *Colonial Pesticides Research Unit, Porton*: screening of new insecticides and tests of their residual properties (mainly organo-phosphorus compounds); dispersion of molluscicides; application of pesticides from aircraft. At the *Agricultural Research Council Unit of Experimental Agronomy, Oxford*: field and pot trials of selected herbicides; physiological and chemical investigations of the mode of action of herbicides. At *Imperial College Field Station, Silwood Park*: measurements of pick-up of insecticides by insects; cholinesterase studies; olfaction in blood sucking insects in regard to the attraction of hosts. At *Long Ashton, Bristol*: investigation of spraying techniques; methods of sampling residues; examination of spraying and atomizing machinery. *Rothamsted Experimental Station*: the toxicity and persistence of insecticidal deposits. *Colonial Pesticides Research Unit, East Africa*: air spraying trials against tsetse; sprayed-hut experiments, with organo-phosphorus insecticides and BHC/Cereclor residues, against mosquitoes; trials of insecticides against *Stomoxys*; work on fungicides, herbicides, molluscicides, etc. *Regional Research Centre Herbicide Unit, Trinidad*: weed research.

The report also summarizes pesticide research in various colonial territories, some of which includes field trials against pests of public health importance.

[For 1958–1959 Report, see this *Bulletin*, 1960, v. 57, 962.]

J. R. Busvine

REPORTS AND SURVEYS

See also p. 568, COLONIAL OFFICE. **Colonial Research 1959–1960. Tsetse Fly and Trypanosomiasis Committee. Report for 1959–1960.**

See also p. 648, COLONIAL OFFICE. **Colonial Research 1959–1960. Colonial Pesticides Research Committee. Thirteenth Annual Report (1959–1960).**

FRY, E. I. **Health Survey of Children from Rarotonga, Cook Islands. III. Skeletal Age and Skeletal Observations.** *J. Trop. Pediatrics.* London. 1960, Dec., v. 6, No. 3, 75–9. [20 refs.]

This survey refers to the same children reported upon in two previous papers [this *Bulletin*, 1960, v. 57, 861; 1961, v. 58, 158]. The skeletal age of 85 Polynesian boys and 79 girls was estimated by the comparison of wrist X-ray photographs with standards given by Greulich and Pyle for children in

Cleveland, U.S.A. (GREULICH and PYLE, *Radiographic atlas of skeletal development of the hand and wrist,* 1950, Stanford: Stanford University Press). Boys were significantly retarded in comparison with the American children from 7 to 10, 13 and 14 years of age; girls from 6 to 10 and 13 years. 26% of the boys and 15% of the girls had skeletal ages more than twice below the standard deviations of mean ages for corresponding Cleveland children. It is suggested that this skeletal retardation is due to insufficient food in early childhood and at adolescence.

Details are given of anomalies of bone development seen in the survey.

T. P. Eddy

BOOK REVIEWS

RODENWALDT, Ernst & JUSATZ, Helmut J. [Edited by.] **Welt-Seuchen-Atlas.** [World Atlas of Epidemic Diseases] Part III. 3rd issue. pp. III/67–III/70, III/75–III/78, III/83–III/86, III/107–III/110, III/123–III/136, 1 text fig. & 10 folding pp. of coloured maps. [Numerous refs.] 1959. [In German & English.] Hamburg 1: Falk-Verlag, Burchardstrasse 8. [Dm. 63.]

The third issue of volume III continues this series; volumes I and II and the first two issues of volume III have already been reviewed [this *Bulletin,* 1953, v. 50, 772; 1955, v. 52, 499; 1956, v. 53, 951; 1957, v. 54, 246, 247 and 1379; 1958, v. 55, 1297]. Material in the present issue deals with the world distribution of louse-borne typhus by F. V. BORMANN, the world distribution of Q fever by L. TERHAAG, leishmaniasis in Asia by C. PIEKARSKI and W. HENNIG, trematodes in Asia by A. ERHARDT, distribution of population in the world and in Asia by F. BURGDÖRFER, world distribution of mycosis and histoplasmosis by L. AJELLO and two maps showing the distribution of poliomyelitis in Europe from 1950 to 1957 and in Central Europe also from 1950 to 1957 by W. DONLE and H. J. JUSATZ respectively.

Each subject is illustrated by a single large multi-coloured map and, in most cases, also by one or more smaller monochrome maps to demonstrate points of particular importance. The maps are accompanied by a text in both German and English, amplifying the details of distribution shown on the maps, and providing references. In the issue received by the reviewer there was no text accompanying the maps showing the distribution of poliomyelitis in Europe and Central Europe. The texts accompanying the maps illustrating louse-borne typhus and leishmaniasis contain notes on the epidemiology of these diseases: geomedical aspects of Q fever and the mycoses are discussed.

As in previous issues the same authors who were responsible for sections of limited geographical extent have now produced maps showing world-wide distributions. The maps maintain their high standard and have not been overloaded with detail. In the map illustrating typhus fever it is not easy to distinguish the shading representing "inadequate hygienic level" from that representing elevation. The completeness of the maps naturally depends on the amount of information available. That for typhus gives very full detail on a global scale; that for Q fever records the information at present available

and indicates the probable situation elsewhere, taking into account climatological and agricultural conditions. On the other hand the map illustrating the subcutaneous and systemic mycoses merely records the countries from which reliable reports of the occurrence of the relevant fungi have been received. Confirmed imported cases of the diseases are referred back to the countries in which infection probably occurred.

The population maps, as in previous issues, are clear and informative. Although the author points out the limitations of the modified dot system in some heavily populated areas, a conglomeration of dots emphasizes the most marked concentrations. The distribution of population in northern Ghana, indicated in Map 79 in Vol. II of the Atlas, is not clearly shown in the third issue (Map 114).

This issue maintains the high standard set by its predecessors by providing, in an easily assimilable form, information invaluable for the epidemiologist which is not readily available elsewhere. *M. J. Colbourne*

POWERS, Leland E. [M.D.] & CHURCHILL, Charles W. [Ph.D.]. **Bibliography of Echinococcosis with Selected Abstracts.** 209 pp. 1960. Beirut: American Unviersity of Beirut, Lebanon.

763 titles are listed in this volume, numbered consecutively and arranged in sections dealing with the characteristics of aetiological agents, epidemiology, immunology, pathology, diagnosis, treatment, prevention and control, and miscellaneous. Within each section, the titles appear in alphabetical order of authors' names and are followed, in about a quarter of the total, by an abstract of the original article published in this *Bulletin, Biological Abstracts* or the *Veterinary Bulletin.* The book has three appendices giving periodical abbreviations, author index and geographical index.

With the exception of 1 reference of 1855 (VIRCHOW), the literature cited covers much of the work published from the earlier years of this century to the beginning of 1959. In their preface, the authors state that the bibliography is not exhaustive, although the coverage is quite comprehensive. They point out that a complete list of the works of DÉVÉ would have unbalanced the bibliography, but they have incorporated a selection of references to his writings from 1903 to 1942.

[Several typographical errors appear—*e.g.* incorrect dates in items 69, 496; year omitted from 423, 448; *Bassillus moniliformis* in 592, "parenchymol" in 633, "Collogen" in 634, "sequalae" in 636—which are not important, but which nevertheless spoil a reference book of this nature.]

A. H. Phipps

UNITED STATES DEPT. OF AGRICULTURE. **Mosquitoes of Medical Importance** [FOOTE, Richard H. & COOK, David R.]. 158 pp., 68 figs. Agriculture Handbook No. 152. 1959, July. Wash. 25: Superintendent of Documents, U.S. Govt. Printing Office, D.C. [$2.50; 22s. 6d.]

This volume is designed to provide military personnel with a ready means of identification of the mosquitoes of medical importance, and to summarize the

information available about mosquito-borne diseases and their vectors in all parts of the world. After an introductory summary about the diseases, which includes references to 22 mosquito-borne viruses, the main part of the work consists of descriptions of the different geographical regions of the world and the incidence and the vectors of malaria, filariasis and the virus diseases endemic to these areas. Pictorial keys are provided for the identification of the adults and larvae of those mosquitoes considered to be important vectors in each area. Some of these keys have already been reproduced in *Mosquito News*. At the end of the volume the vector species are listed alphabetically, with notes on their bionomics, distribution and relation to disease. The volume itself is well laid out and most of the figures are clear, if not all accurately drawn.

This work is intended for the non-specialist to identify mosquitoes and to estimate the importance of his identification. Unfortunately, it is doubtful if it is reliable for this purpose. Each of the pictorial keys is labelled as suitable for the identification of the mosquitoes of medical importance for each geographical region, but unless the user of the book has read in a sentence in the introduction that filariasis was not considered important to the military in constructing the keys, any culicine mosquito, unless it belongs to the subgenus *Stegomyia*, will be rejected as of no medical significance in most of the regions considered. Filariasis vectors are, however, mentioned in the text but there is no way for the non-specialist to find out if these mosquitoes are actually biting him. It is difficult to justify this omission when the forest canopy vectors of yellow fever are included.

At times certain of the keys would be misleading. *Mansonia uniformis* could be identified as *Aedes furcifer* or *A. taylori*, and some of the species of *Anopheles* not mentioned could be identified as important vectors. Anyone who has tried to show students the difference between hairs on anopheline larvae will have doubts about the ability of a non-specialist to use correctly some of the larval characters shown.

A specialist would not use this volume for identification but the illustrations might be useful for teaching mosquito taxonomy. The summaries of the incidence of mosquito-borne diseases in each geographical region are very useful and one of the interesting parts of this work is the bibliography, which contains 347 titles, of which over 50 are official publications of the United States Government and presumably these are not readily available in most parts of the world.

B. R. Laurence

LEWIS'S MEDICAL, SCIENTIFIC & TECHNICAL LENDING LIBRARY. **Supplement to the Catalogue of Lewis's Medical, Scientific and Technical Lending Library including a Classified Index of Subjects with the Names of those Authors who have treated upon them. Supplement 1957–1959.** 306 pp. 1960. London: H. K. Lewis & Co. Ltd., P.O. Box 66, 136 Gower Street, W.C.1. [10s. 6d.; to Library Subscribers 5s.]

The 1957 edition of this catalogue, to which the present work forms a supplement, was extensively reviewed in this *Bulletin* [1958, v. 55, 349] and the reviewer paid tribute there to the continuing value of Lewis's catalogue with its bimonthly supplements to subscribers and to librarians. This volume catalogues the additions to the library in the years 1957 to 1959. Most medical or scientific

monographs published in English in hard covers have been added to the collection, sometimes in multiple copies. The lacunae are principally works in English published in Europe or the British Commonwealth.

The previous reviewer gently chided the publishers for the out-moded form of the subject index. It is interesting to see that the subject heading then chosen to illustrate the reviewer's thesis has been adopted in this supplement; but his broader argument, that a modernization of the list of subject headings with a co-ordinated system of cross-references would not only assist the users of the catalogue but also save printing costs, has not been met. To give one further example, a user will find the heading *Tropical Medicine*; *see also Malaria.* A reasonable inference from this is that books on tropical diseases, other than malaria, are listed under this head; in fact, books on leprosy and smallpox are indexed separately. Under this same heading, *Tropical Medicine*, one finds HUDSON's work on bejel indexed; while ALSTON and BROOM's book on leptospiroses is entered only under *Parasitology* and *Veterinary Sciences*.

It is remarkable that this extensive catalogue has been published 10 months after the close of the period covered; and it may be that the need for speedy publication has prevented systematic review of the subject headings. Such revision, with the addition of cross-references, will be a necessity in the next full edition. *V. J. Glanville*

NOTICE

Consideration has from time to time been given to the question whether it would be desirable to include authors' addresses in the headings of abstracts in the *Bulletins* and it has been decided that the additional time and cost involved would not be justified. Subscribers are advised, however, that the Bureau will, on request, notify them of the name and address of the author of the article, or the publisher of the journal, from which an abstract has been made.

The Bureau also deals with enquiries from individual subscribers relating to abstracts which have appeared in the *Tropical Diseases Bulletin* and the *Bulletin of Hygiene*; correct references and the exact nature of the information required should be stated.

Printed in Great Britain by The Eastern Press, Ltd., London and Reading